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Outdoors in Georgia

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Water Resource Management

Georgia is not running out of water, but by the same token, we now realize that our water resources are not unlimited either. The water resource is definitely limited even in the best of times, and as the extremely dry weather of last summer pointed out, we don't always live in the best of times. For the first time we, in the supposedly "water rich" East, faced the kind of large scale water shortages and rationing that we previously only heard about in the West.

Water is not only essential to life, its abundance is essential to the quality of life. Access to adequate and *dependable* supplies of pure water is central to the continued growth and prosperity of the state. For these reasons, it is imperative that we begin now to plan our future growth in terms of available water and the potential conflicts of its use.

We have mentioned our water supply problems before (See OIG, January 1977, "Water Availability"). Today the needs are still critical despite the progress we have made with the Groundwater Use Act of 1972 and the Surface Water Management Act passed by the Legislature in 1977. These acts must now be implemented and translated into practical management of our water resource.

One potential problem area lies in the southwestern corner of the state where last summer's drought has spurred the development of agricultural irrigation (See "Bread and Water . . ." this issue, page 11.) With irrigation, that portion of the state has tremendous food production potential. The problem comes when we consider that municipalities and industries in that area also need water, the same water perhaps. The solution to these conflicts is to never let them happen, to plan around them.

In a recent speech, Governor Busbee said, ". . . irrigation systems are in place . . . which if pumping to the maximum, would draw enough water out of the ground in one day . . . to surpass the water usage for a day in the entire metropolitan Atlanta area." To illustrate the other side of the problem, he also said, "The key question to farmers throughout Southwest Georgia who have spent—or are on the verge of spending—hundreds of thousands of dollars for irrigation equipment and wells is the rate at which water can be pulled from the ground; when it can be used; and when it will be recharged."

In order to answer these complex and serious questions, and to develop an effective management plan, much research must be done. In the same speech, Governor Busbee proposed a five-year study to develop and analyze all existing information on water supply and use throughout the state with first priority on the groundwater of Southwest Georgia.

The study will seek to compile and evaluate information on location, amount and availability of groundwater, its quality and its rate of recharge among other things. Only after these things are known can we hope to develop any sort of comprehensive and realistic management plan which allocates and puts priorities on water use.

Water rights are a complex issue wherever conflicts of use arise. It is the purpose of this study to begin to define those rights and to minimize potential future conflicts. With optimum water management, we can use our water wisely and well for multiple purposes and ascertain the highest priority uses during critical periods. As Governor Busbee said, "We intend to develop a program which will allow us to predict problems and take action to prevent them."

Sea Duck Brigade

By Dr. Lloyd Newberry

Photography by the Author

We arrived at our destination, a boat ramp on a small tidewater creek, at 4:00 a.m. and stepped out of my Blazer to face a biting northeast wind and plummeting thermometer. "Are we still going?" Rip shouted, "or do you think it'll be too rough to decoy?"

I didn't answer momentarily but walked down to the foot of the ramp, peering through the darkness trying to estimate the depth and stage of the tide. If my calculations were correct, the tide should be low enough to expose a large sand bar in the mouth of the sound and this barrier

should provide calm water in the area where we had planned to hunt.

"It looks like we'll be all right, Rip; the bar should be exposed and protecting our stake blind location from this driving northeaster."

Dick chimed in, "Yes, and the wind should be a great help to us, keeping those birds moving. The only problem now will be crossing the sound to reach the lee of that bar."

For once, everything seemed to point to a good hunt—enough wind to keep the birds moving and low enough tide to make hunting in our stake blind comfortable and safe. I was very excited about the prospects of this hunt.

I moved to Savannah nine years ago and immediately discovered there a bonanza in sea duck hunting. Each fall, usually around the middle of November, thousands of diving ducks work their way down the Atlantic tidewater filling the sounds, bays and offshore waters of the Georgia coastline with a variety of waterfowl. Rafts of sea ducks composed of scoters, old squaw and eiders frequent the open sea and assorted divers, including canvasbacks, redheads, goldeneyes, buffleheads, ruddy ducks, bluebill and broadbill are found working the inshore waters.

As indicated, there is a distinction between "sea ducks" and these other divers; however, most coastal residents group all diving ducks which frequent the saltwater environs into the sea duck category.

Two regular hunting partners are also avid waterfowlers. Rip McGaughey correlates his free time with the migratory and flight patterns of our local waterfowl. Dick Schulze, an ophthalmologist, is an avid pursuer of anything legal and wearing feathers.

The problem we face every season is how to get close enough to these ducks to hunt them with any consistent degree of success. Out where these divers raft and feed, there are no firm banks to stand on and no tall grass in which to hide. Last year we tried towing a john boat into the sound and lying down in the boat with a large raft of decoys spread around a 40 yard perimeter. But this proved to be a wet, cold business, as well as an unstable platform from which to shoot.

For years, I had wanted to construct a stake blind similar to those used along the Chesapeake Bay, and finally this past summer Dick and I, with the help of our sons, spent several days constructing a blind on the top of a set of vacated pilings. The pilings had obviously been left standing because they were in shoal water and presented no hazard to navigation.

Today was to be our first hunt in the stake blind so, needless to say, we were quite excited. Hunting in the open sea places a premium on safety precautions; for this reason, we always take two boats. After we launched boats loaded with decoys, guns, cameras and other gear, our outboards sparked to life and we were off. As we entered the sound we were confronted with choppy seas, a dubious gift from the howling northeaster. We slowly picked our way around the marsh edges trying to take advantage of protected water whenever we could. Although the large sand bar I was counting on for protection was over a mile off shore, it was long enough to break the run of the sea, and we were relieved to find calm water when we approached its lee. It didn't take long, once in calmer water, to reach our stake blind, approximately one half mile off shore.

We still had 45 minutes before dawn, every minute of which would be needed to place 150 decoys. I have found that the willingness of diving ducks to decoy is directly proportional to the number of decoys in a spread. The decoys in our spread were comprised of a multitude of dubious characters, reprobates from many years of burlap bags and bouncing duck boats. We placed the decoys in a wide circle around the blind, tied our boats underneath and climbed up into the box. With buckets to sit on, thermos bottles of hot soup, and lots of tales of past hunting expoits to tell, we waited for daylight—almost in comfort. What more could anyone ask for? Maybe a heater!

We didn't have long to wait. Legal shooting hour, dawn, comes quickly at sea. "There's a large flight of bluebills moving out of the east," Rip said. "It looks like they are going to move early. Probably been bounced around on that northeaster all night and are ready for some breakfast and calm water."

"Behind us," Dick whispered, and I looked around in time to see a pair of goldeneyes swinging off the decoys and bearing over toward the jetties at the mouth of the Savannah River. "All right, boys—time to look sharp!"

I was concentrating on a flight of buffleheads working west of our blind when the report from Dick's double barrel almost made me jump out of the blind. "Three bluebills just slipped right into the decoys," Dick said. "And they kept right on slipping," Rip retorted, laughing at Dick, who seldom misses an easy shot.

"Heads up! Those buffleheades are going to buy the whole outfit." A dozen buffleheads flew right into the open area we had left among the blocks and gave themselves up. We collected four birds out of the surprised group.

"Look at that flight of scoters," Dick exclaimed, "there must be five thousand of them!" A long low undulating line of American scoters was working in out of the east. For a moment we were lost in a trance as we absorbed the panorama before us. Flight after flight of ducks working in out of the sunrise from a rough night's roost at sea, looking for their favorite feeding grounds—the shallow offshore shoals abundant in shellfish and sea lettuce. We were witnessing a time-enduring waterfowl spectacle taking place just as it had centuries before, when there were no duck hunters and no stake blinds.

A shot from Rip catapulted me back to the situation at hand. A large redhead drake was investigating the decoys a little too closely and Rip connected. "Great shooting Rip," Dick acknowledged, "that's good duck and excellent eating, too."

"Twelve o'clock," I whispered as a flight of canvasbacks headed straight for the decoys. Dick and I fired simultaneously, each collecting a fine bullnecked drake. "That takes care of our limits on cans and redheads; we can only take one of either species," I remarked, climbing down, as it was my time to take the boat and do the retrieving. The stake blind was too high and the ocean normally too choppy to use retrievers although we each have Labradors that we use on puddle ducks (inland, shallow water feeding ducks). I quickly collected the birds and was easing the boat back through the blocks when a flight of old-squaws tried to decoy. They saw me and flared wide of the spread. "It never fails," said Dick. "Get out in the boat and here come the ducks."

No sooner was I back in the blind than a flight of a hundred or more broadbills smoked the spread. We all emptied our guns and the broadbills all kept going. "How did we fail to get a single bird?" Rip wondered. "I think I tried to kill the whole flight with one shot," Dick laughed. "They should be over Brunswick by now."

Just then Rip shouted, "Look in the decoys," as he pointed to a pair of ruddy ducks that had slipped in unseen. Dick stood up to make them jump, but instead they dove and when they popped up they were out of range.

The ducks continued working our spread, the majority being bluebill and broadbill (Lesser and Greater Scaup) and American and surf scoters. The rough sea had the ducks continually in the air, trading back and forth past our blind. We soon approached our combined limits of 15 ducks when a fat drake surf scoter flew head-long into my shot pattern and limited me out. We unanimously agreed that we were witnessing too great a spectacle to leave, so we broke out the hot soup and cameras and relaxed for another half hour in the warm morning sun as we enjoyed the waterfowl display. We had truly experienced a classic hunt, and with the large number of decoys, the stake blind and countless birds, it reminded me of stories I had read about the great shooting the market hunters had enjoyed in the early '20s. Needless to say, we were satisfied with the day.

Having loaded our gear back in the boats, we began the arduous job of picking up 150 decoys, a job which takes twice as long as setting them out. Our trip back across the sound was more comfortable as we had a following sea; soon we were home cleaning gear and ducks.

Dick, Rip, and I and other members of our "sea duck brigade" have pursued coastal waterowl hunting from Maryland to Florida and feel that the sea ducking is as good on the Georgia coast as anywhere in the country. It is a virtually untapped resource. True, it takes some specialized gear and a duck hunter's oblivion to pain and discomfort, but the rewards are many. I witnessed thousands of divers last year in the sounds, bays and tidal backwaters from Savannah to Brunswick, and the few hunters I know who pursued them had a high degree of success. We were fortunate to find the old set of pilings from which to shoot, but there are many other methods that have proved quite successful. We have enjoyed excellent gunning from jetty rocks and exposed oyster bars.

Wear clothing the color of the shells or rocks and bring a large spread of decoys, and you'll find ducks will work well in range. I have spent many hours shooting from a concealed position in the point of a salt marsh and have even camouflaged myself on exposed (low tide) sand bars with sand colored burlap and enjoyed excellent shooting there. The secret, once again, is plenty of decoys.

There is no greater thrill than the screaming of wings as a hundred canvasbacks smoke over your set, or as a family of wire-tails (ruddy ducks) zip into the blocks flying an inch off the water. For duck hunters, a morning filled with thousands of bluebills and scoters trading back and forth high overhead is real excitement.

Most of the species are plentiful here, and there is a liberal season in which to pursue them. Duck season in Georgia normally opens around the middle of November and closes around the middle of January with a week or two closed in the middle of the season. Georgia hunters were allowed one canvasback or one redhead last year, but bag limits were higher on other species. Federal regulations should be consulted each year as the season dates and bag limits vary slightly.

Another reward occurs at the dinner table. I have yet to experience a redhead, canvasback or ruddy duck that was not delicious. Sea ducks may be a problem. A lot of duck hunters turn their nose up at eating sea ducks because they have never had them prepared properly. I've eaten coot stew (scoters) in New England and broiled bluebill in Florida, and I can see why nobody likes them. However, I have found a tantalizing way to prepare sea duck that makes the most discriminating epicures drool. Skin the breast and legs and marinate them overnight in Italian oil salad dressing. Rub garlic salt, pepper, and butter into the meat and grill in tinfoil, constantly basting with the marinade. You can't beat it!

And you can't beat the excellent hunting opportunity available in the saltwater bays and creeks of Georgia's coast.

Linda Howard

WHY BEAVER CONTROL?

By Aaron Pass

A beaver dam Bill Bryant

Trapping has been called the world's second oldest profession. Indeed, humankind's quest for fur has been going on since one of our distant ancestors discovered that the cold, dismal world of ice age Europe was a bit more tolerable when one was wrapped in the skin of a defunct mammouth. More recently, it was the quest for fur that kept expanding the horizons of the North American continent as traders and trappers provided the vanguard of settlement and civilization.

A central figure in the American frontier drama was the beaver, a large semi-aquatic rodent whose fur was in great demand during most of the eighteenth and nineteenth centuries. The fur resource, centering on the beaver, was a key element in almost all territorial acquisitions of that era and helped develop manifest destiny as a national policy.

Closer to home, beaver were noted in Georgia by William Bartram who wrote in 1774, "There are yet a few beavers in East-Florida and Georgia, but they abound most in the north of Georgia, and in West-Florida near the mountains." Their presence is also recorded by many place names which include "Beaver" as part of their name. Augusta apparently had its origin as a trading post where, in the mid-eighteenth century, the English were doing a brisk trade "in deer skins, beaver and other furs" with the local Indians. This system soon gave way to a more primary form of exploitation, as Europeans schooled in wilderness ways and backed by superior technology eliminated the Indian as middleman and began trapping on their own. This uncontrolled exploitation of the fur resource coupled with the advance of an agrarian civilization which wiped out habitat, caught beavers and other fur bearers in the middle and soon depleted the resource.

Beaver were pretty much gone by the 1850s which was the height of the beaver hat craze. A few scattered colonies were reported as late as 1880. By the time the new science of wildlife biology got underway in the 1930s, some investigators concluded that the beaver had been extirpated from the state.

Conservation agencies and individuals began restocking beaver in Georgia in the 1940s. Concurrently, rigid trapping regulations protecting beavers were passed and enforced. Helping this effort along was the fact that the beaver hat had fallen out of fashion and the low price on beaver pelts did not encourage trappers to do the considerable work and run the legal risks of illicit beaver trapping. By 1953, a Game and Fish Commission survey found beavers to be "common" along the Flint and Chattahoochee Rivers, "scarce" on the Ocmulgee, and "rare" along parts of the Altamaha, Oconee and Ogeechee Rivers.

The decision to restock beavers in the state was made not only on the value of beavers as a fur resource but on the multitude of associated wildlife values the activities of beavers produce. Most noted for their role as "nature's engineers," beavers are well-known for their dam building prowess. These clever mammals are the only species besides man known to alter their environment to fit their needs.

Beaver dams are usually a focal point of wildlife activity. They provide wetland habitat for crustaceans, amphibians, waterfowl and other species of birdlife in areas where that habitat may be limited. The diversity created by a beaver dam attracts other creatures, including predators which prey on the multitude of life forms found in the vicinity of the dam. The dams also hold back flood waters and assist in the water purification processes of the wooded floodplain ecosystem.

Today beavers are quite numerous in the state and the telltale signs of their activities—a dam, a pond and,

About the artist: Linda Howard of Gulfport, Mississippi specializes in wildlife painting, both watercolor and acrylics. She was one of 43 wildlife artists in last October's Outdoors in Georgia *Wildlife Art Show.*

Not everything about beaver ponds is bad. They provide excellent duck hunting and benefit many other species of wildlife. A typical beaver lodge is shown to the right of the hunter.

Aaron Pass

occasionally, dome-shaped lodges—are found on many woodland streams. As expected the comeback of the beaver in Georgia has produced some beneficial ecological results. The wood duck is the only species of waterfowl which nests in the state in significant numbers and is a beautiful and important game species. It was on the verge of extinction due to loss of its preferred breeding habitat—small woodland ponds. The proliferation of beaver dams is a key factor in the wood duck's return to abundance. Likewise, the river otter, a very valuable fur bearer once apparently destined for extirpation, is now abundant and benefits from the habitat produced by beaver dams.

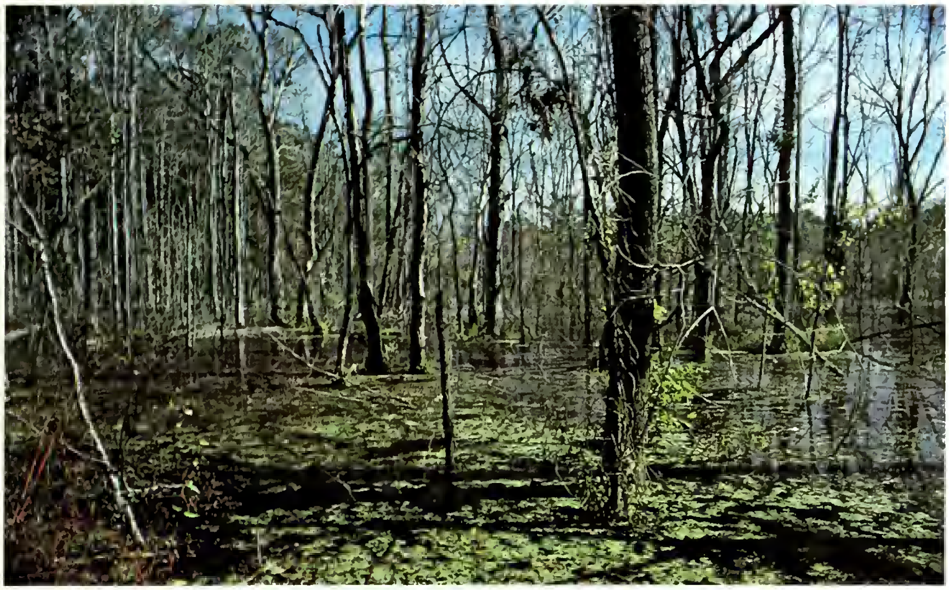
Unfortunately, all is not rosy in the beaver's comeback to the state. A very adaptable animal, the beaver population has grown to nuisance proportions in many areas. Ever a proficient dam builder, beaver dams are now causing some damage to the state's forest lands and untold consternation to the state's farmers, road builders and suburban homeowners. As early as 1960, the State Forestry Commission undertook a survey to determine the extent of beaver damage to forest resources. In 1960, 1967 and 1975 these surveys documented extremely severe economic losses to timber growers from beaver activities. At the same time the Game and Fish Division has noted an increase in the agricultural and homeowner complaints from beavers which flood pastures and crops and dine on ornamental plants in the yard.

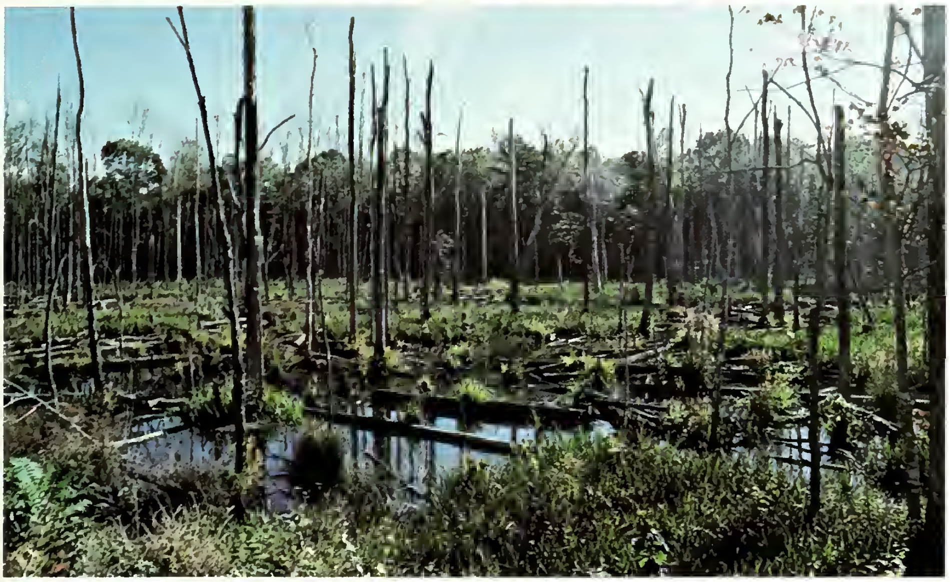
This beaver explosion has occurred due to a lack of a controlling influence on the beaver populations. The beaver is a relatively large animal (averaging about 40 lbs. as an adult) with big teeth. This, coupled with the effective defensive system of the beaver pond, leaves the beaver few effective natural enemies. Historically the alternative control measure has been human trapping. This has not been effective in recent years because beaver pelt prices have been too low to encourage trappers to undertake the rigorous work necessary to take and prepare hides. Although pelt prices have risen dramatically in the past two years, it is not yet clear that commercial trapping alone will abate the state's beaver problem. Acknowledging this, the 1977 Legislature directed the Game and Fish Division of the Department of Natural Resources to investigate existing methods of beaver control.

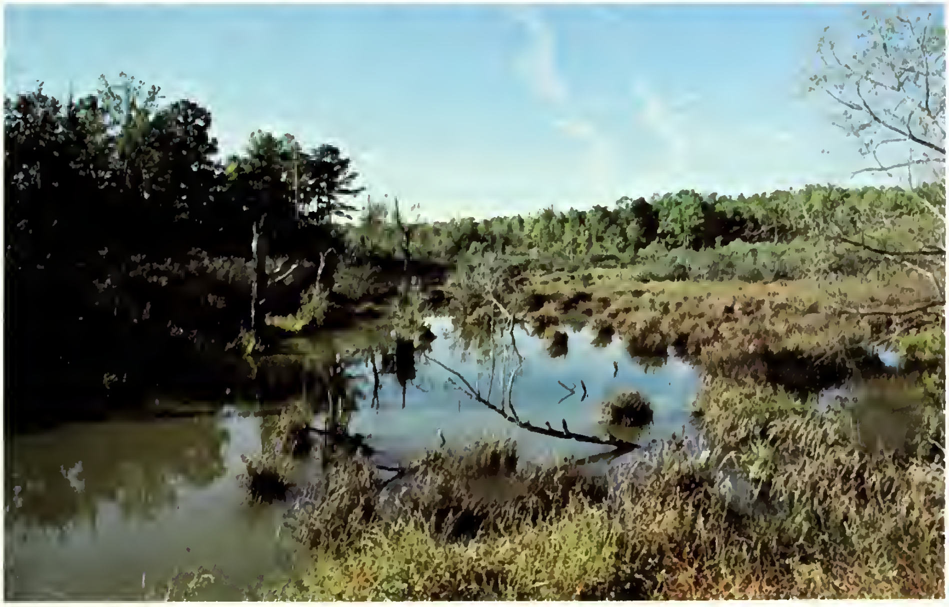
As a result, the Game and Fish Division has undertaken a comprehensive study of beaver control techniques and has prepared a bulletin for the use of landowners and managers in need of advice on beaver nuisance abatement. These methods are exactly that—control measures for nuisance situations—because the beaver is far too valuable an animal to be once again hounded from the state.

The most favored and apparently most efficient method of control found has been the age-old expedient of controlled trapping, hopefully with a decent economic return for the pelts. The development of the so-called "killer trap" which kills the beaver quickly and humanely has taken a lot of the mystique out of the extremely complicated "drown sets" which must be employed with leg-hold traps. For best results, a coordinated control program would include both types of traps used by an experienced professional trapper. The use of a planned trapping program by the landowner or an available professional trapper usually effects the desired degree of beaver control on any given property.

Another recommended method, where the landowner wants to retain the beavers for an aesthetic reason, is the drain. Since most of the problem with beavers is their desire to ever increase their aquatic habitat, a system which controls the pond's size can help the landowner who wants to have his beavers and







Three steps of succession: Early inundation (top) shows a new pond. Later the trees die (center) and grass, weed and low shrub growth take hold in the collecting sediment. Finally the pond is almost completely filled with sediment (bottom) which supports lush grass, weed and shrub growth. At this stage, beavers maintain canals in the marshy bog.

Photos by Bill Bryant

Bill Bryant

Breaking a beaver dam is not only difficult, it seldom affords any long-term relief from the problem.

his yard at the same time. The three-log drain is an inexpensive method of controlling the water level of the beaver pond without destruction of the beavers.

Many other methods have been experimentally tried, usually with poor success. The removal of the dams and lodges is one of the most ineffective. Beavers are great little builders as anyone who has ever tried to disassemble a beaver dam will agree. Usually efforts to break the dam result in only a repaired dam by sunrise and no abatement of the problem. About the only way to beat nature's engineer structurally is to use heavy equipment, explosives and a scorched-earth-policy. Even then there is no guarantee.

Likewise, the removal of all vegetation near the dam site is a Pyrrhic victory. It may stop the beavers but only at the expense of the timber you wish to protect.

Shooting beavers is usually an exercise in futility. Due to the animals' habitats they seldom present more than a quick shot, so the success rate is low. It's great sport, but it's not going to solve any problems. However, shooting beavers, when followed up by more direct methods, may produce the desired result.

Poison is the least favored alternative. The potential environment risks associated with this method make it an unacceptable alternative. Furthermore. poisoning has never been shown to produce effective control on a beaver population.

Other techinques such as live trapping, fencing, electricity, sterilization, repellants and even the use of flush dogs and the introduction of alligators have been experimentally tried, but success has usually been limited. Some of these methods have specialized application, but only trapping and pond drains seem to offer the efficient broad spectrum control desired in most beaver nuisance situations. They are the proven techinques which produce relief if practiced in a planned manner.

The landowner must consider the degree of beaver control necessary in each situation. Beaver populations can be eliminated by some of the same methods used for simple control and that is *not* good management. Beavers are an integral part of the southern woodlands ecosystem, and they can produce, in terms of waterfowl, fish, fur and aesthetics, some very real economic and recreational values.

As fur prices continue to rise, beaver control might cease to be a problem. In fact the day may come when they are protected by trapping season just like other fur bearers. But, for now, it is acknowledged that beavers are troublesome and control is often desirable. In this context the Game and Fish Division is offering a comprehensive bulletin on control measures, and, in addition, wildlife biologists are available to consult with individual landowners with persistent beaver problems. It is hoped that through effective control in those instances where beavers are an intolerable nuisance to human activity, we can solve the problems while retaining this ingenious and beneficial animal in natural ecosystems.

* * *

For readers who are more interested in control of nuisance beavers, a special report has recently been prepared by the Game and Fish Division. Copies of this report are available from: The Department of Natural Resources, Office of Information and Education, Room 719, 270 Washington Street, S.W., Atlanta, GA 30334.

BREAD & WATER

Agriculture and Irrigation in Southwest Georgia

By Bill Hammack

Southwest Georgia has the potential, with irrigation, of becoming the corn belt of the South and consequently one of the important breadbaskets of the world.

That is the view of one of the leading authorities on corn in the United State, Dr. Harold Gurley, extension agronomist of the University of Georgia, who is in charge of educational activity on feed grains in the state. "With irrigation, Southwest Georgia offers the potential of double-cropping feed grains annually. Nowhere else in the nation can farmers achieve this practice," said Gurley. "One reason we are able to double-crop is because of our long growing season. There's an average of 275 frost-free days in Georgia's Coastal Plain. That's a natural resource we enjoy which is not available in midwestern corn states, one that we can use effectively. To double-crop, a farmer can plant hybrid corn in February, harvest it in mid-July, then plant feed grain such as grain sorghum. Other crops, such as vegetables, also have the potential for multiple cropping with irrigation.

"Generally abundant water is another magnificent natural resource we've been blessed with," said Gurley. "With our 50 inches of average annual rainfall, in what we have come to call a normal year, the water replenishment effect in our region far surpasses the rate in such areas as the western plains of Texas and Nebraska,

Bob Busby

Bob Busby

with 12 to 15 inches a year. However, nothing on or in or under this earth is unlimited. Therefore, we must accelerate water research in Southwest Georgia, and it's imperative that we give it a top priority."

First requirement of such groundwater research is acquisition of more complete information about the nature of Southwest Georgia's groundwater system. Communication among agricultural engineers, geologists and farmers is vital, said Dr. Dale Threadgill of the University of Georgia, head of the agricultural engineering department at the Coastal Plains Experiment Station in Tifton. "There are presently no documented widespread general water problems in the Coastal Plains that can't be solved, but local problems will crop up from time to time," explained Threadgill. "Most of these arise because of a lack of understanding of the relationship between pumping rates and the proximity and depths of wells. With enlightened practices at all levels, we can expect the availability of this tremendous resource to continue, but we need more information about groundwater and we need to spread the word."

We must also decide how we're going to treat this resource. We can abuse it and lose it or we can use it wisely. "We must look at what goes into an aquifer as well as what is taken out," said John Fernstrom, manager of the groundwater program in the Environmental Protection Division of the Department of Natural Resources. "We must take into consideration the recharge rate of an aquifer. We must also be aware that what goes in is not necessarily through natural channels. Pollution by wastes can damage or destroy its potential. If its potential is destroyed, the question of use rate becomes moot. Among areas calling for study is one of overall development, so that the growth of a water-intensive farm economy in Southwest Georgia, with its far-reaching potential, suffers as little constraint as practical. To nurture this growth, we need the answers to some questions as soon as research can provide the necessary information."

Some questions are fundamental. Why does a farmer fail to find enough water to utilize his irrigation rig for maximum effect when he drills a well? *Answer*: In Southwest Georgia, there are multiple aquifers, and a driller must have a good understanding of where water-bearing strata lie and how to develop these strata.

Few farmers today labor under the assumption once accepted that there's a great big lake or a mighty river underground, said Sam Pickering, state geologist and director of the Geologic and Water Resources Division of Georgia's Department of Natural Resources, "An aquifer or water-bearing formation is a permeable stratum similar to a stony sponge, or like loose sand found in a child's sandbox. Water-bearing strata lie at different levels, analogous to layers in a cake which are so widely irregular that a cook striving for a masterpiece of bakery would weep . . . or enter it in a surrealistic art show.

"Our water resource is an immeasurably rich cake, but we had better know exactly how to slice it. Everybody requires a chunk: industry, municipalities, farmers. Farmers in Southwest Georgia have seen the advantages of irrigation, and irrigation is flooding in. We need to gather as much information as we can about where the water is, and how much of it there is to set up computer models which will tell us about the impact on the aquifer system of doubling, tripling, quadrupling water use.

"With this immense increase in use, we must redouble our efforts in exploration for water. Water is our most precious mineral resource. We must mine water with the same diligent care we expend on other mineral treasures in Georgia."

Impact study of water use requires documentation, as Rodney Grantham, U.S. Geological Survey hydrologist, pointed out. "In a California situation," he recalled, "cities and industries had documented their water use. Farmers hadn't. In water-critical southern California, when it became necessary to split up the pie, farmers, with no documentation, got what was left. You can't compare southern California, where water is a problem, with southwestern Georgia, where it isn't at the present time. Documentation isn't required to substantiate water needs in Georgia, but it is necessary to provide a reliable index of use. It is a requisite part of the body of knowledge we seek about groundwater in southwest Georgia. With such information, we can gain a clearer picture of the impact of irrigation on the groundwater system, a study we are involved with right now."

Obtaining data about water use is simple if you employ a sophisticated gadget. You merely clamp an instrument on the outside of a pipe—you don't drill any holes—and a sonic beam in the device pings and pongs madly back and forth at an incredible rate and tells you precisely how much water is flowing through. Oceans of water flowed through Southwest Georgia irrigation pipes during this past crop year because of the drought. Grantham said that some farmers ran their systems 60 or 70 days, 24 hours a day, with each well pumping 1200 gallons a minute. In a normal year, farmers generally run their irrigation rigs from 10 to 20 days during the growing season.

No matter how many days an irrigation rig pumps, it translates into money. An irrigation system costs up to $100,000, depending on size of the rig and depth and diameter of the well. Power requirements for operating the rig are also expensive. Some farmers make use of ponds or creeks rather than wells, knowing full well that in a drought year, ponds can run dry and creeks can run low. Some augment pond levels with a six or eight inch well, costing less than a 12-incher. While irrigation has become another big-ticket item in today's capital-intensive farming, it more than pays its way.

Wimbric Walker of McRae currently irrigates 250 acres in a total cultivation of more than 1,000. "This past crop year," he said, "the irrigated acres not only covered the drought losses sustained on the non-irrigated cropland, but carried the entire farm load."

Irrigation turns Southwest Georgia land, previously scorned as worthless, into productive acreage. In 1971, Alvin Newton of Colquitt bought 1,000 acres of sandy soil pocked with scrub oak in Decatur County. "Folks laughed about it," said Newton. "They said a rabbit wouldn't go in there during the daytime because there wasn't enough cover to hide in." Today Newton irrigates 3,000 acres with 17 rigs. This past year, his spring crops were 500 acres of peanuts, 1,000 of sweet corn, 1,500 of purple-hulled pinkeye peas; his fall crops were 1,400 acres of peas and 600 of speckled butterbeans. An irriga-

Center pivot systems such as this one are becoming the most popular type of irrigation rigs in Southwest Georgia.

Joe Courson

tion system distributor and well driller, Newton has installed irrigation on more than 100,000 acres since 1968.

Thus the development of farming in some sections of the state may be charted as evolution from mule-and-plow work to agribusiness to hydroponics, because irrigated farming has become virtually hydroponics in many areas. Farmers use the soil only as something to hold the plants up, as in Florida south of Miami where they farm the limestone on the surface, breaking it up enough to support the plants, supplying water and nitrogen through irrigation systems.

Whatever the quality of the cropland, installation and maintenance of an irrigation system represents considerable investment, and farmers need more than educated guesses about optimum use for maximum benefit.

"There are several factors involved in protecting the farmer's investment," said the Coastal Plains Experiment Station's Dr. Threadgill. "Critical to his return on investment is the question of how much water should be pumped during the growing season. Cost per gallon—or cost per inch of water applied—is fixed in each individual circumstance. If he over-irrigates, he's wasting money. If he under-irrigates, he's wasting his time, as well as nullifying his expensive advantage. Timing is another vital factor. If he irrigates too late, he's wasting water again. Spacing of wells is another important element in setting up an irrigation system. Today's successful farmer follows a management program that's just as rigorous as those adhered to by his counterparts in industry and commerce. Management of water resources has become more than just good business, however. It has become a necessity for the continued progress of our state and well-being of our citizens."

For agricultural well-being, various crops require various amounts of water, as farmers know. Farmers are aware, for example, that corn is a thirsty crop. One acre of corn gives off to the air about 3,000 or 4,000 gallons of water each day, as the U.S. Department of the Interior Geological Survey points out. (A big oak tree transpires only about 40,000 gallons a year.) To replace a day's transpiration of one acre of corn would take a center pivot irrigation system pumping from a 12-inch well about three or four minutes. Such a rig is capable of a thousand gallons a minute or more, around one and a half million gallons a day.

Adding up all the irrigated crop acreage in Georgia quickly runs into many square miles, and when you multiply that sum by the amount of water required for the various crops, you arrive at an annual water use figure that is, geologically and hydrologically speaking, astronomical.

"However, in an average year," said David Swanson, chief hydrologist of the Department's Geologic and Water Resources Division, "Georgia receives 50 inches of precipitation. Thirty-five inches is returned to the atmosphere by evaporation and use by trees and plants. Nine inches becomes run-off water going directly into rivers and streams. Six inches soaks into the ground to recharge our groundwater reservoirs. This amount of water generally is sufficient to meet the needs of the state as a renewable resource."

The deepest reservoirs under Georgia contain water that is millions of years old, having seeped through layers of clay and sand stone for thousands of millennia. Its aged taste, however, is probably salty. One of the chief groundwater reservoirs south of Albany is the Ocala limestone. This aquifer is the closest one to the surface there; it extends to depths of around 150 to more than 400 feet in that area. Using Dougherty County as an illustration, the next aquifer encountered on the way down is in the Claiborne group, a rich supply, from about 150 feet to around 450. The City of Albany, which relies heavily on groundwater, taps this reservoir and a deeper productive one, in the Midway group, around 560 to 740 feet deep. A small quantity of water can be found in the Upper Cretaceous series, from 740 feet to 975; below 1,000 feet, the water probably is brackish.

While the Ocala aquifer is near the surface in the western region of the Coastal Plain, it plunges more and more deeply underground on its way eastward, with a corresponding escalation in drilling costs. For this primary reason, the sharpest increase in irrigation currently is taking place in Southwest Georgia, where the drilling is easier on the pocketbook.

"For most of Southwest Georgia," Swanson explained, "water availability seems to be no problem at the present. The problem is lack of information about Southwest Georgia water. We're deeply involved in a concerted effort, state and federal, to seek answers to some questions which demand answers, if we hope not only to continue economic progress but to maintain quality of life.

"There are many questions. Rural water use has been the smallest category up until now. However, as the number of irrigation facilities increases, rural use may exceed municipal supply in total water demand. All of the cities in Southwest Georgia obtain their supply from groundwater. About half the water used by Georgia industries comes from groundwater. What quantitative impact will the dramatic increase in irrigation have on the aquifer system? What qualitative effect will various municipal, agricultural and industrial contaminants have?

"At the moment, we can neither quantify nor qualify effects. We have dived into a sea of questions and we aim to come up with some answers. We're carrying on reconnaissance studies in many areas where high-capacity irrigation wells have been introduced. We're considering water quality implications. Eventually, if a farmer asks us what effects a high-capacity well will have on the aquifer system in his area, we hope to be able to provide him with the information. When we gather as much data as we can, we'll attempt to categorize the information into a tool that farmers—and other water-users, municipal and industrial—can use to their advantage."

The only areas of the state in which geologists have developed comprehensive profiles of water availability are in parts of Coastal Georgia. The equal task in Southwest Georgia is as big as it is vital to the state. Since research and development generally require considerable time, and since an understanding of how the aquifer systems respond to use is the payoff, Sam Pickering and David Swanson and their associates in state and federal agencies are sweating for this understanding.

The payoff for Georgia farmers who employ irrigation and other water-users will be tremendous, if present estimates and extrapolations can be validated by research.

"Taking into consideration such factors as industrial use of water, and cranking into the equation figures on municipal growth spurred by industrial development," said Pickering, "it is not overly optimistic to say that most of Southwest Georgia can supply a large irrigation demand. But we must go to the well wisely, and we must protect the well carefully."

First, however, we must learn more about better ways to take care of the well. As Leonard Ledbetter, director of the state's Environmental Protection Division, explained, "It is imperative that we identify a management strategy to manage properly *all* of our groundwater resource for the protection of agricultural users, as well as municipal and industrial users, and individual consumers.

"Development of a management system which would encompass this broad area, and meet these absolute needs, obviously will require legislation. Additionally, we must make sure that the technical expertise is on tap in the Department of Natural Resources and other agencies to utilize scientific and management information for wise use of the resource.

"Development of such a management program will enable us to bring into focus the interconnection of groundwater and surface water," Ledbetter pointed out. "When we talk about 'groundwater' and 'surface water,' we're not talking about apples and oranges. Essentially, we're talking about the same thing. Groundwater has a significant impact on surface water and vice versa. Extraordinary use of groundwater may in some cases lower the water table, and if you lower the water table in some areas, you may reduce stream flow. On the other hand, presence of a large impoundment, such as Walter F. George lake, may contribute to recharging groundwater. We are aware of the interconnection, of course, but we need far more research for a better understanding of the two systems. With a more comprehensive grasp of the close interrelationship between ground and surface water, we can more effectively establish proper management practices of our water resources. Good management practices will provide a continuing abundance for all of us, on down through the generations."

Cable tow rigs like this serve the irrigation purpose better in long, narrow fields and others of irregular shape

edge of excellence

Photography by
Bob Busby

From the time the first prehistoric creature on its way to becoming man smashed two stones together and used the jagged pieces for cutting, man has had a high opinion of edged tools. Even today with the edged tool no longer of paramount importance in warfare or hunting, man strives for excellence in these archaic implements. The hand crafting of knives by individuals is today a growing hobby and, in the best paleolithic traditions, each maker is as firmly convinced his product surpasses mass-produced knives as that earlier savage who knew he could flake a better flint.

These knives which demonstrate that quest for excellence were made by Jack Crockford who happens to be Director of the Game and Fish Division. The knives shown from left: a large folding Bowie, two folding lock-blade hunters, (top) small game knives, a replica of a Revolutionary War pattern, and (above) large hunting knives.

HOODED MERGANSER

by Gib Johnston

Painting by Dale Cochran

"It is a distinctively American bird and is the most beautiful of its kind. Vivacious, active, elegant in form, graceful in carriage, its presence adds a peculiar charm to to the little ponds and streams on which it delights to disport. It frequents clear streams and muddy pools alike, and its white and black plumage strongly contrasted against the shining water and the surrounding foliage makes a picture not soon forgotten. One who has seen a small flock of this species playing in the dark waters of a tiny shaded pool with two or three beautiful males darting among the others, opening and closing their fan-like crests and throwing the sparkling drops in showers over their glistening plumage, will rarely find anywhere a finer and more animated picture of bird life."

These words were written by one Edward Howe Forbush in the 1917 book *Game Birds, Shore Birds & Wild Fowl* to describe a bird that few but the most avid bird-watchers can call by name. The proper name for the colorful and unusual bird is *Mergus cucullatus*, but even its common name, hooded merganser, is unfamiliar to most.

It is, however, one of the most spectacular water birds and is seen occasionally in Georgia.

The male hooded merganser with his white "hood" or crest is as arrogant and proud as he is beautiful. When pursuing his smaller and less colorful female counterpart—often in competition—he puts on quite a show. That snow-white crest which is his trademark plays an important part in the hooded merganser's rituals of courtship.

The hooded merganser's springtime courtship charades are a fascinating part of the breeding instinct. In full breeding plumage, the male doggedly pursues the elusive, almost passive female, following her in and out of the freshwater woodland ponds and swamps which are this merganser's habitat. Approaching her, the wily male rises off the water with his "hood" depressed. But when he falls to the water's surface, he suddenly expands the crest while extending his long neck. Then, almost haughtily, the male will throw back his head as he settles in the water. Then the "dancing" begins and he swims quickly back and forth in front of the female, following that with more sudden movements. All the while, his neck is fully extended and his white crest is rapidly expanding and contracting. After the female chooses a mate, the final ritual is an elaborate "drinking" display.

Hooded mergansers nest in hollow trees or stumps located in wooded areas near water. Actually, nesting requirements are more similar to those of the common wood duck than to other mergansers. The nest site, typically high above ground, is chosen by the female long before mating. She will lay from five to 12 eggs, one every 1-2 days. Eggs measuring approximately 2-1/10″ x 1-2/3″ are nearly round and white, glossy and hard. Incubation takes 31 days and is the sole responsibility of the female since the male departs for regions unknown soon after mating.

The female merganser feeds two to three times a day while incubating her eggs, characteristically flying back to the nest at full speed. At the last possible moment, she will close her wings and dive into the egg-filled nest.

She will raise only one brood annually. If the original nest is destroyed by snakes or raccoons or other predators, she will not build a second.

Young hooded mergansers are tri-colored, with dark brown down on the top of the head, back of the neck, back, rump, tail and wings. Their cheeks and sides of neck are light brown, and the chin, breast and belly are white.

Newly hatched hooded merganser ducklings, like young wood ducks, remain in the nest for about 24 hours before jumping out—no matter how high the nest—to follow their mother. The young, which feed mainly on insects, will begin to fly after about two months.

Adult hooded mergansers are well-equipped for catching the fish which make up the bulk of their diet. (The diet also includes crustaceans and insects.) They can dive and chase fish and catch prey in their long, slender, serrated bills. This feature is quite unlike other

ducks whose bills are typically broad and flat.

The male is most easily recognized by the fan-shaped white crest, outlined in black, on its head. The white breast and rusty sides are seldom noticed since this merganser swims very low in the water. At times this crest is so compressed that only a small triangle of white shows. But at other times, the male hooded merganser will expand the crest or frequently raise and lower the crest, so that from a distance it looks like a blinking light.

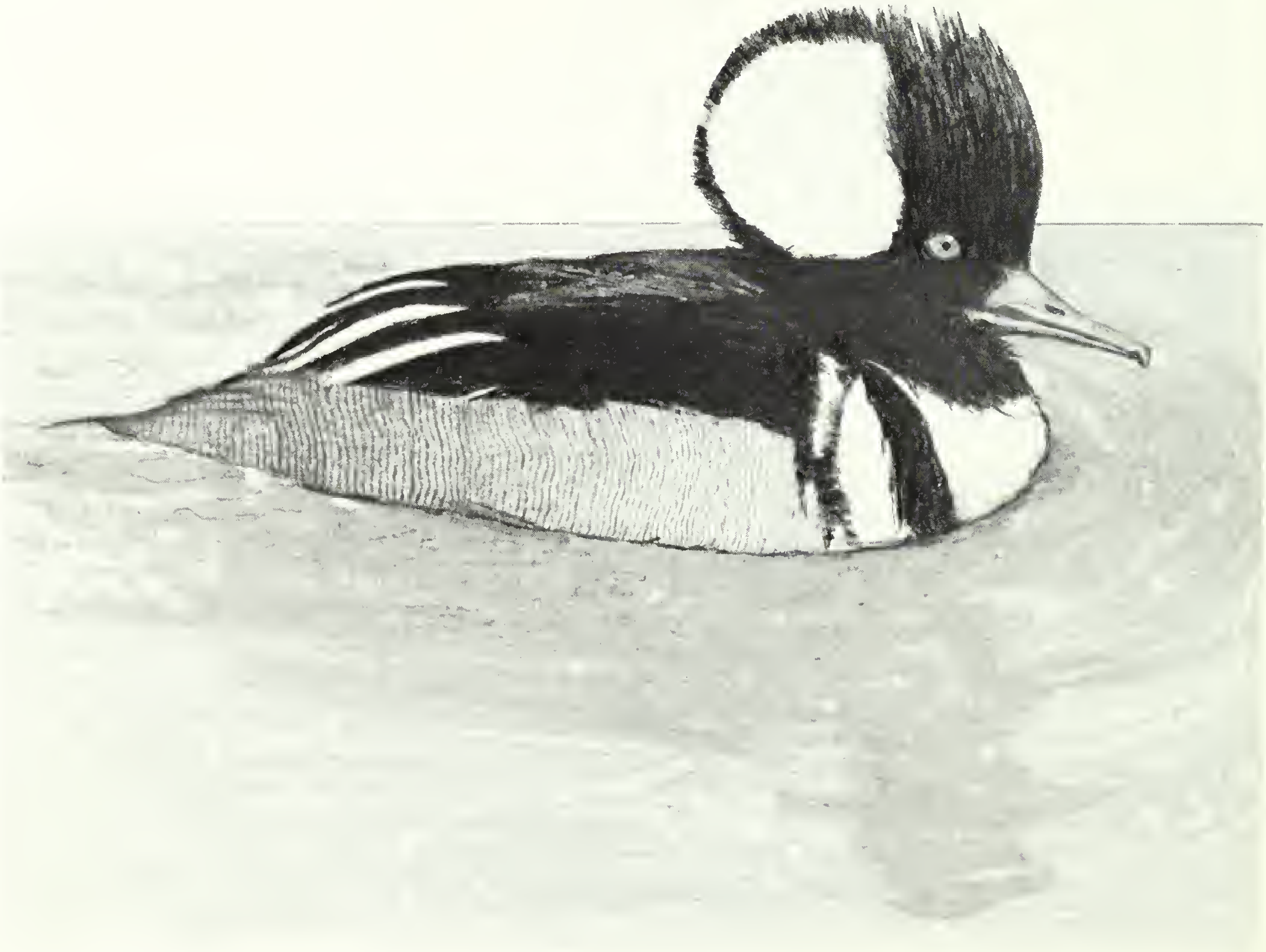
A full-grown male hooded merganser will weigh up to 1 pound, 7 ounces and will be up to 20 inches long, counting his four-inch tail and 1-2/3″ bill. Wingspan can be 26-1/2″.

The smaller female of this species is drab, at best, with a rusty-brown head and smaller reddish-brown crest. She sports a grayish-brown back, face and neck, a brownish-yellow bill, white belly and dark brown rump, tail and wings. The female hooded merganser is distinguished from the female wood duck by a square white patch on her wing and her long, slender bill.

The hooded merganser is very wary and very fast. When flying at speeds of up to 45 miles per hour, it extends its neck, flattens its crest and aligns head, neck and body in horizontal line. However, when in danger, it is more apt to escape by diving rather than flying out of sight.

Hooded mergansers are often mistaken for wood ducks since they are similar in size and nesting and habitat requirements. But the hooded merganser does not make good table fare so is not generally consideered a game bird.

Hooded mergansers prefer freshwater woodland ponds and slow streams, avoiding open marshes preferred by other ducks. They often winter in the southern U.S., near the coasts of Louisiana, Mississippi, Alabama, Georgia, Northern Florida, South Carolina, North Carolina and Virginia, and north as far as Massachusetts and Lake Michigan, and as far west as Colorado, Utah and British Columbia. Hooded mergansers have been seen, however, as far away as Alaska, Bermuda and the coast of Europe. Their breeding range extends from northern British Columbia and New Brunswick, New York and Oregon, to New Mexico, Arkansas and Gulf states. They are fairly common in suitable habitat throughout Georgia.



Drawing by Michael Nunn

Outdoor Sketchbook

Management of White-Tailed Deer

This is the first installment of a new feature we are calling "Outdoor Sketchbook." In the following months we will publish articles (like this one on the whitetail deer) on several of Georgia's most popular game birds and animals.

This series of articles will deal with each species' natural history as well as modern management techniques suggested by the Game and Fish Division.

It is hoped that this information will help develop an interest among landowners and managers in putting some of these techniques to work on their land. We also hope that all of our readers will enjoy learning about the creatures in the "Outdoor Sketchbook" series.

by Dick Whittington

The white-tailed deer (*Odocoileus virginianus*) is, without a doubt, the most adaptable game animal in Georgia. This remarkable animal abounds in good habitat and can also survive in poor habitat. The whitetail is able to withstand many environmental pressures such as climatic factors, human habitation and land use changes that would limit other game species.

History

Deer were abundant in Georgia when settlers arrived; they soon became an important trade item during the colonization period. One early report describes the port of Savannah shipping 600,000 deer skins between 1755 and 1773. Slaughter of deer was then virtually uncontrolled as they were killed for both hides and meat. Laws were enacted in 1790 to curtail the slaughter, but they were loosely enforced.

By 1900, deer had become virtually extinct. Heavy hunting had eliminated them from the mountains. A combination of habitat decimation through extensive agriculture and heavy hunting pressure eliminated deer from the Piedmont. The

Bob Busby

Large gangs of does may look like a bright promise to hunters, but to game managers a burgeoning doe population indicates future overpopulation with resultant habitat destruction.

few remaining deer in Georgia were restricted to dense swamps and river bottoms in the Coastal Plain.

By purchasing large acreages of abandoned crop lands in various stages of reforestation the U.S. Forest Service provided the habitat needed for deer restoration. Federal funds provided to state game departments through the Pittman-Robertson Act were extensively used for deer restoration.

Present Status

The Department of Natural Resources' deer restocking program is now virtually complete. Georgia's deer herd has swelled to an estimated one-half million animals, though population levels vary with the greatest number occuring in the Piedmont and upper Coastal Plain.

Georgia deer include a number of genetic strains. Since all are white-tailed deer, genetic races can be distinguished only by the trained eye. Color variation, stature, thickness of coat and length of the hair are primary distinguishing characteristics.

Breeding

Mating activity occurs primarily in November although this may vary depending upon geographic location, genetic race and population density. In general, Coastal Plain deer breed later than Mountain and Piedmont deer. Most breeding takes place between October 15 and January 15.

The whitetail buck that was so shy during the summer turns into a belligerent animal during breeding season. Fights between bucks are common, but they rarely result in serious injury. The more aggressive bucks probably do most of the breeding.

The gestation period of the white-tailed doe is about 200 days. There is no evidence to indicate that does seek any special place to bear young. During their first fawning season, a young doe will typically bear a single fawn. With good habitat conditions, older does usually bear twins. Fawns average five to seven pounds at birth. Doe fawns may become sexually mature during their first year under ideal habitat conditions, but this is less likely in buck fawns.

White-tailed bucks shed their antlers following each breeding season. The peak of antler shedding probably occurs in January and February. New antlers begin to grow in April and are usually fully developed by late August.

Predation

There are no serious wild predators of deer. Bobcats take fawns occasionally and on rare occasions have killed adult deer. Feral dogs take a small toll, but in well-established deer populations the loss is not usually damaging. However, reported incidents indicate that some restocking efforts have been ruined by feral dogs. Adequate escape cover such as wet areas and large streams are helpful aids to deer under conditions where dogs are common.

Food Habits

Deer are chiefly browsing animals but may graze when certain grasses and weeds are available. An average size deer will consume approximately six to nine pounds of food each day. Their diet consists mainly of leaves, tender shoots, tender twigs, herbs and grasses. During certain seasons soft fruits, hard mast and mushrooms are eaten. But since these seasonal foods are not always available, browsing and grazing are considered to be the most important feeding practices.

Some of the more important

Aaron Pass

This closed canopy pine stand offers few wildlife benefits to deer or anything else. Here thinning and perhaps burning would enhance wildlife values.

browse plants are greenbrier, Japanese honeysuckle, strawberry bush, beautyberry, trumpet vine, jessamine, dogwood, poplar, sassafrass, sweetbay, blackgum, sweetgum, maple, blackhaw and rhododendron. Common mast and fruits eaten by deer are acorns, plums, blackberries, blueberries, hawthorne, grapes, persimmons, gallberries, palmetto berries, crabapples and honey locust beans.

To farmers' dismay deer are especially fond of the foliage of soybeans, peas, watermelons, cantalopes, wheat, oats and rye, and they also eat the hard fruit of soybeans and corn. Both the foliage and fruit of apple and peach trees are eaten by deer.

Diseases and Parasites

Deer are subject to common livestock diseases and are frequently accused of being carriers. However, few livestock disease outbreaks can be positively attributed to deer.

The only serious disease of deer in Georgia has been hemorrhagic disease which causes numerous small hemorrages throughout the body and is believed to be found only in deer. (See Sept./Oct. '77 *OIG.*) Recently substantial losses of deer have been attributed to hemorrhagic disease.

All deer have some forms of parasites. Lungworms have been known to weaken deer to the point that other forms of illnesses may kill them. Brainworms have taken some deer but present no real threat to a healthy deer population. The horrendous screw worm fly is not the dreaded killer of deer that it once was since an eradication program virtually eliminated this parasite from Georgia.

Habitat Requirements

Even though white-tailed deer are extremely adaptable, they must have food, water and cover to produce healthy populations.

Food supplies in good habitat should meet the needs of deer during all seasons, even the most critical late winter period. Fruits and mast are not absolutely necessary though they are desirable. Deer can thrive on good, palatable browse and grasses.

The best water sources in deer habitat are streams, but lakes, ponds and sloughs are also important and are most beneficial when spaced more or less evenly throughout the habitat. However, deer can exist in some areas without a permanent water supply.

Cover requirements for deer are best met with heavily timbered areas, thickets and young timber reproduction. Rivers, lakes, swamps and marshes provide escape cover that is not easily accessible by hunters and predators. If harrassment and predation is low, deer can survive without protective cover.

Habitat Management

A management plan designed to meet the requirements of deer should provide a variety of foods during all seasons. Major emphasis should be placed on producing browse between ground level and the maximum reach of deer (about five feet). Some emphasis should be placed on producing hard mast and soft fruits where they can add substantially to browse.

Harvesting timber in a manner that will favor browse production is one good management tool. Short timber rotations produce browse more regularly than long rotations. Periodic thinnings between the final harvest cut increase sunlight on the forest floor, thus encouraging the growth of certain browse plants. Much excellent deer range has been ruined by shading when timber stands are too thick.

In pure pine timber, intermediate cuts should be made as frequently as possible to stimulate browse production. An 80-year saw timber rotation with thinnings every eight years has been used to produce satisfactory volumes of timber while maintaining very good deer browse.

In mixed pine-hardwood timber types with an 80-year rotation, thinnings should be made every seven to ten years. Browse production will be greatest at four to five years following the cuts and will decline gradually. Stands of mast-producing hardwoods should be protected to provide a balance between mast and browse.

In hardwood timber types the emphasis should be on mast production. Long timber rotations, as long as 100 years if feasible, are desirable. Periodic removal of poor growing hardwoods is an accepted management practice.

When clear cutting is a necessary timber management practice, consideration should be given to size, shape and distribution of the clear cuts. A good rule of thumb: clear cutting should not exceed three percent of the total acreage annually. Long, irregularly shaped clear cuts provide more of the important "edge" effect and are more beneficial than square or round cuts.

Controlled burning in pine and pine-hardwood timber types is a valuable management tool. Fire reduces many plants to sprouts which are important to deer. However, care should be taken to protect valuable hardwood stands from fire. In addition, the transition zone where the pure hardwood type meets the pine-hardwood or pure pine type should be protected. Frequent fires in the hardwood type will retard growth and may eliminate the desirable species altogether. On the other hand, pines are fire resistant and can be burned quite early in the timber rotation. As a general rule, controlled fire can be used every four years in pine stands. Initially, two burns in succession may be necessary to control undesirable species and remove ground litter which suppresses seed germination.

Food plantings may be made in forest clearings, firebrakes and power line rights-of-way. They serve a dual purpose: feeding deer during critical periods and luring deer for easier hunting. Since late winter is the critical period of food shortage, green forage in food plantings can partially offset the shortage. Additionally, food plantings can partially offset food shortages during the development of a timber stand, particularly during non-timbering periods. Good winter green foods would include rye, ryegrass, wheat, oats and clover. They should be planted in September to be mature enough to attract deer during the hunting season. This timing will also allow plants to develop a root system and toughen somewhat before cold weather.

Providing planted food for deer during the summer is probably unnecessary except on very poor range. If plantings during summer can be justified economically, include peas, soybeans, sorghum, peanuts, millet, velvet beans and watermelons. In many cases leaving a small portion of a crop unharvested can serve the same purpose as planting food specifically for deer.

Herd Management

Management principles are not complete without some mention of regulation of harvest. An adequate harvest is necessary to maintain a balance between the animals and their food supply, or all the habitat management work will be ruined. As much as 40 percent of a deer herd can be safely harvested each year when food conditions and reproduction are good and when there are not other serious mortality factors. This 40 percent rule can be applied to a great deal of the Piedmont and upper Coastal Plain. In the Mountain and lower Coastal Plain regions a 20-30 percent harvest each year can be tolerated.

The problem of harvesting adequately cannot be solved by hunting bucks alone. It is widely accepted that buck hunting takes only about 10 percent of a deer herd. Unless there are serious problems with poaching, predation or disease, a herd can grow rapidly even with a heavy buck harvest. Deer of both sexes must be harvested to check the population growth. Manipulation of the percentage of female deer in the harvest is a practical method of controlling deer numbers. A doe kill of 40 percent of the total harvest should stabilize a population. Any percentage substantially above or below this figure would produce a population decline or increase accordingly. Utilization of legal either-sex deer hunting days should control populations where needed.

When intensive deer management is desired, contact an office of the Department of Natural Resources, Game and Fish Division. Trained wildlife biologists are available to plan and recommend management practices that are beneficial to deer.

Clearcutting under proper controls is of great benefit to deer and numerous other wildlife species due to the increased habitat diversity it affords in woodland areas. The cuts should be small, scattered, irregular in shape and should leave stream courses protected.

1978 TIDE TABLES

This Tide Table for 1978 is furnished to you compliments of OUTDOORS IN GEORGIA for your use in coastal fishing and hunting.

Fold it and put it in your tackle box, hunting coat, or wherever it will always be handy, for use all year long.

Predicted tide times and heights are shown for the Georgia coast at the bar at the Savannah River entrance. You may compute the tide times for other points listed by subtracting or adding hours and minutes as indicated. A plus time indicates a later tide and a minus time an earlier tide. Daylight saving time is not used in this table. All daily time predictions are based on Eastern Standard Time meridian. Predicted times may be converted to daylight saving time by adding one hour to these data.

These data are from the **1978 Tide Tables for the East Coast of North and South America**, National Ocean Survey, U.S. Department of Commerce, Rockville, Md. 20852.

	DIFFERENCES Time	
GEORGIA Savannah River	**High Water Hrs./Min.**	**Low Water Hrs./Min.**
Tybee Light	−0 08	−0 15
Port Wentworth	+0 33	+0 41
Tybee Creek and Wassaw Sound		
Tybee Creek entrance	−0 07	−0 02
Thunderbolt	+0 34	+0 09
Isle of Hope, Skidaway River	+0 52	+0 25
Ossabaw Sound		
Egg Island	+0 06	+0 07
Fort McAlister, Ogeechee River	+0 50	+1 13
Cane Patch Creek entrance	+0 57	+0 40
St. Catherines and Sapelo Sounds		
Walburg Creek entrance	+0 25	+0 20
Kilkenny Club, Kilkenny Creek	+0 31	+0 13
Sunbury, Medway River	+0 56	+0 42
Blackbeard Island	+0 20	+0 19
Mud R., at Old Teakettle Cr.	+0 47	+0 43

	DIFFERENCES Time	
Doboy and Altamaha Sounds	**High Water Hrs./Min.**	**Low Water Hrs./Min.**
Blackbeard Cr., Blackbeard I.	+0 21	+0 44
Sapelo Island	+0 00	+0 02
Darien, Darien River	+1 10	+1 12
Wolf Island	+0 06	+0 35
Champney I., S. Altamaha R.	+1 12	+2 30
St. Simons Sound		
St. Simons Sound bar	+0 01	+0 05
St. Simons Light	+0 24	+0 28
Troup Cr. entr., Mackay R.	+0 54	+0 49
Brunswick, East River	+0 55	+0 40
St. Andrew Sound		
Jekyll Point	+0 28	+0 28
Jointer Island, Jointer Creek	+1 02	+0 49
Dover Bluff, Dover Creek	+0 57	+0 49
Cumberland Wh., Cumb. R.	+0 40	+0 42
Cumberland Sound		
St. Mary's Entr., north jetty	+0 15	+0 15
Crooked River entrance	+1 23	+1 12
Harritts Bluff, Crooked River	+2 09	+2 12
St. Marys, St. Marys River	+1 21	+1 13

SAVANNAH RIVER ENTRANCE, GA., 1978

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

OCTOBER

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0101	0.4	16	0137	-0.8
SU	0709	7.7	M	0748	8.9
	1325	0.2		1405	-0.5
	1919	7.8		2012	8.2
2	0141	0.2	17	0223	-0.7
M	0742	7.9	TU	0830	8.8
	1406	0.1		1451	-0.3
	1955	7.9		2054	7.9
3	0218	0.1	18	0307	-0.5
TU	0818	8.1	W	0912	8.5
	1448	0.1		1536	0.0
	2031	7.8		2134	7.5
4	0256	0.0	19	0349	-0.2
W	0856	8.2	TH	0951	8.2
	1529	0.2		1618	0.4
	2112	7.7		2214	7.1
5	0335	0.0	20	0430	0.2
TH	0939	8.2	F	1034	7.8
	1614	0.3		1659	0.8
	2155	7.5		2256	6.7
6	0418	0.1	21	0514	0.6
F	1027	8.1	SA	1118	7.4
	1701	0.5		1744	1.2
	2243	7.3		2341	6.4
7	0506	0.3	22	0601	1.0
SA	1120	7.9	SU	1205	7.1
	1755	0.8		1834	1.5
	2341	7.0			
8	0604	0.6	23	0032	6.2
SU	1221	7.7	M	0654	1.3
	1858	0.9		1255	6.8
				1930	1.6
9	0042	6.9	24	0126	6.1
M	0710	0.7	TU	0751	1.5
	1327	7.6		1348	6.7
	2006	0.9		2029	1.6
10	0151	6.9	25	0224	6.1
TU	0823	0.7	W	0851	1.4
	1438	7.6		1444	6.7
	2114	0.7		2123	1.4
11	0304	7.0	26	0322	6.3
W	0932	0.5	TH	0946	1.2
	1551	7.7		1540	6.8
	2214	0.3		2213	1.1
12	0416	7.4	27	0420	6.6
TH	1036	0.1	F	1038	0.9
	1657	8.0		1634	7.0
	2310	-0.2		2258	0.8
13	0519	7.9	28	0511	7.0
F	1132	-0.2	SA	1125	0.6
	1755	8.2		1723	7.2
				2342	0.4
14	0001	-0.5	29	0555	7.5
SA	0615	8.4	SU	1211	0.3
	1227	-0.4		1806	7.5
	1844	8.4			
15	0051	-0.7	30	0024	0.2
SU	0704	8.7	M	0635	7.9
	1318	-0.5		1257	0.1
	1930	8.4		1848	7.6
			31	0106	-0.1
			TU	0716	8.2
				1340	-0.1
				1929	7.7

NOVEMBER

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0148	-0.2	16	0240	-0.4
W	0757	8.5	TH	0846	8.2
	1425	-0.2		1512	0.0
	2010	7.7		2107	7.0
2	0230	-0.3	17	0321	-0.2
TH	0839	8.5	F	0923	7.9
	1511	-0.2		1552	0.3
	2052	7.6		2144	6.7
3	0316	-0.3	18	0401	0.1
F	0923	8.5	SA	1002	7.6
	1558	-0.1		1631	0.6
	2139	7.5		2221	6.4
4	0403	-0.2	19	0443	0.5
SA	1014	8.3	SU	1040	7.2
	1648	0.1		1712	0.8
	2232	7.2		2304	6.2
5	0453	0.0	20	0525	0.8
SU	1109	8.0	M	1125	7.0
	1744	0.3		1757	1.0
	2332	7.0		2351	6.0
6	0553	0.3	21	0613	1.0
M	1210	7.7	TU	1210	6.7
	1844	0.5		1844	1.2
7	0036	6.9	22	0042	6.0
TU	0658	0.5	W	0708	1.2
	1316	7.5		1300	6.6
	1950	0.5		1939	1.2
8	0145	6.9	23	0133	6.0
W	0810	0.6	TH	0806	1.2
	1424	7.4		1351	6.5
	2054	0.3		2034	1.1
9	0255	7.1	24	0232	6.2
TH	0919	0.4	F	0904	1.1
	1533	7.4		1447	6.5
	2153	0.0		2127	0.8
10	0402	7.4	25	0328	6.5
F	1022	0.2	SA	0957	0.8
	1638	7.5		1541	6.6
	2249	-0.3		2215	0.5
11	0505	7.8	26	0423	6.9
SA	1118	-0.1	SU	1049	0.5
	1734	7.6		1638	6.7
	2339	-0.5		2302	0.1
12	0558	8.2	27	0515	7.3
SU	1211	-0.2	M	1139	0.1
	1825	7.7		1729	7.0
				2347	-0.2
13	0026	-0.7	28	0604	7.8
M	0645	8.4	TU	1228	-0.2
	1259	-0.3		1818	7.2
	1909	7.6			
14	0112	-0.7	29	0033	-0.5
TU	0727	8.5	W	0651	8.2
	1346	-0.3		1315	-0.4
	1949	7.5		1904	7.4
15	0158	-0.6	30	0122	-0.7
W	0807	8.4	TH	0737	8.5
	1430	-0.2		1405	-0.6
	2029	7.3		1949	7.5

DECEMBER

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0211	-0.9	16	0256	-0.4
F	0823	8.6	SA	0857	7.5
	1454	-0.7		1527	0.0
	2037	7.5		2118	6.3
2	0300	-0.9	17	0335	-0.2
SA	0910	8.5	SU	0933	7.2
	1544	-0.7		1605	0.2
	2128	7.3		2154	6.2
3	0351	-0.8	18	0414	0.0
SU	1003	8.3	M	1011	7.0
	1635	-0.6		1643	0.3
	2224	7.2		2232	6.0
4	0444	-0.5	19	0453	0.3
M	1059	7.9	TU	1048	6.8
	1728	-0.4		1720	0.4
	2325	7.0		2314	5.9
5	0541	-0.2	20	0536	0.5
TU	1159	7.6	W	1130	6.6
	1827	-0.3		1802	0.6
				2359	5.9
6	0028	6.9	21	0625	0.7
W	0646	0.1	TH	1215	6.4
	1303	7.3		1850	0.6
	1928	-0.2			
7	0132	6.9	22	0049	5.9
TH	0754	0.2	F	0720	0.8
	1406	7.0		1306	6.3
	2030	-0.2		1943	0.6
8	0237	7.0	23	0143	6.1
F	0900	0.2	SA	0820	0.8
	1509	6.8		1354	6.2
	2128	-0.3		2034	0.4
9	0343	7.2	24	0239	6.3
SA	1001	0.1	SU	0916	0.6
	1615	6.7		1452	6.2
	2224	-0.5		2130	0.1
10	0444	7.4	25	0338	6.6
SU	1058	0.0	M	1013	0.3
	1715	6.8		1553	6.3
	2313	-0.6		2223	-0.2
11	0537	7.6	26	0439	7.0
M	1150	-0.1	TU	1107	-0.1
	1803	6.8		1654	6.5
				2316	-0.6
12	0001	-0.7	27	0535	7.5
TU	0624	7.8	W	1201	-0.4
	1238	-0.2		1750	6.7
	1851	6.8			
13	0048	-0.7	28	0006	-0.9
W	0709	7.8	TH	0630	7.9
	1324	-0.2		1253	-0.8
	1929	6.7		1844	7.0
14	0133	-0.7	29	0101	-1.2
TH	0747	7.8	F	0721	8.3
	1408	-0.2		1346	-1.1
	2007	6.6		1935	7.3
15	0215	-0.5	30	0154	-1.4
F	0824	7.7	SA	0810	8.4
	1447	-0.1		1438	-1.3
	2042	6.5		2026	7.4
			31	0246	-1.5
			SU	0859	8.4
				1529	-1.4
				2118	7.4

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.
HEIGHTS ARE RECKONED FROM THE DATUM OF SOUNDINGS ON CHARTS OF THE LOCALITY WHICH IS MEAN LOW WATER.

SAVANNAH RIVER ENTRANCE, GA., 1978

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

JANUARY

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0000	6.3	16	0135	6.4
SU	0629	0.4	M	0758	0.3
	1221	6.5		1403	5.9
	1852	0.2		2021	-0.1
2	0055	6.3	17	0231	6.3
M	0729	0.4	TU	0857	0.5
	1315	6.4		1458	5.7
	1950	0.0		2117	-0.1
3	0155	6.5	18	0330	6.2
TU	0834	0.3	W	0953	0.5
	1412	6.3		1557	5.5
	2050	-0.2		2208	-0.1
4	0259	6.8	19	0426	6.3
W	0938	0.1	TH	1044	0.4
	1516	6.4		1654	5.6
	2153	-0.5		2257	-0.2
5	0407	7.2	20	0518	6.4
TH	1039	-0.3	F	1131	0.3
	1625	6.5		1745	5.7
	2249	-0.9		2343	-0.3
6	0513	7.6	21	0603	6.7
F	1137	-0.7	SA	1217	0.1
	1729	6.8		1827	5.8
	2347	-1.3			
7	0612	8.0	22	0029	-0.4
SA	1235	-1.1	SU	0645	6.9
	1830	7.1		1302	0.0
				1905	6.0
8	0045	-1.6	23	0112	-0.5
SU	0709	8.4	M	0722	7.0
	1329	-1.4		1344	-0.1
	1924	7.4		1941	6.1
9	0141	-1.7	24	0154	-0.6
M	0800	8.5	TU	0757	7.1
	1424	-1.6		1423	-0.2
	2016	7.5		2014	6.2
10	0234	-1.8	25	0234	-0.6
TU	0851	8.4	W	0830	7.1
	1514	-1.6		1500	-0.3
	2109	7.5		2048	6.3
11	0328	-1.6	26	0313	-0.6
W	0942	8.2	TH	0905	7.0
	1605	-1.6		1537	-0.3
	2202	7.3		2123	6.3
12	0419	-1.4	27	0350	-0.5
TH	1034	7.8	F	0941	7.0
	1653	-1.3		1611	-0.3
	2256	7.1		2201	6.4
13	0509	-0.9	28	0432	-0.4
F	1125	7.3	SA	1019	6.8
	1743	-1.0		1648	-0.3
	2349	6.9		2245	6.5
14	0602	-0.5	29	0514	-0.2
SA	1218	6.8	SU	1104	6.7
	1834	-0.6		1730	-0.3
				2333	6.5
15	0044	6.6	30	0602	0.0
SU	0658	0.0	M	1151	6.5
	1310	6.3		1818	-0.2
	1927	-0.3			
			31	0027	6.6
			TU	0700	0.1
				1247	6.3
				1916	-0.2

FEBRUARY

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0127	6.6	16	0238	6.0
W	0806	0.2	TH	0910	0.8
	1346	6.2		1508	5.3
	2023	-0.3		2130	0.3
2	0233	6.7	17	0337	6.0
TH	0914	0.0	F	1006	0.7
	1454	6.1		1609	5.3
	2128	-0.5		2223	0.2
3	0346	6.9	18	0436	6.1
F	1020	-0.3	SA	1057	0.5
	1605	6.2		1707	5.5
	2233	-0.8		2313	0.0
4	0457	7.3	19	0529	6.4
SA	1119	-0.7	SU	1145	0.3
	1715	6.6		1755	5.8
	2333	-1.2			
5	0601	7.7	20	0000	-0.2
SU	1217	-1.1	M	0615	6.6
	1816	7.0		1230	0.1
				1837	6.1
6	0032	-1.5	21	0045	-0.4
M	0656	8.1	TU	0654	6.9
	1312	-1.4		1312	-0.1
	1913	7.4		1915	6.4
7	0127	-1.7	22	0128	-0.6
TU	0748	8.2	W	0730	7.1
	1405	-1.6		1353	-0.3
	2003	7.6		1950	6.6
8	0221	-1.8	23	0210	-0.7
W	0836	8.2	TH	0807	7.2
	1454	-1.7		1430	-0.5
	2053	7.6		2025	6.8
9	0310	-1.7	24	0250	-0.8
TH	0923	7.9	F	0841	7.2
	1541	-1.6		1507	-0.5
	2141	7.5		2102	6.9
10	0400	-1.4	25	0330	-0.8
F	1010	7.5	SA	0918	7.1
	1627	-1.4		1544	-0.6
	2228	7.3		2139	7.0
11	0446	-1.0	26	0411	-0.7
SA	1056	7.1	SU	0958	7.0
	1710	-1.0		1622	-0.6
	2317	7.0		2224	7.1
12	0533	-0.5	27	0455	-0.5
SU	1142	6.6	M	1041	6.8
	1756	-0.6		1704	-0.5
				2312	7.0
13	0005	6.7	28	0544	-0.2
M	0623	0.0	TU	1132	6.6
	1228	6.1		1754	-0.3
	1847	-0.2			
14	0054	6.4			
TU	0715	0.4			
	1319	5.7			
	1938	0.1			
15	0142	6.1			
W	0812	0.7			
	1410	5.4			
	2034	0.3			

MARCH

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0007	6.9	16	0055	6.3
W	0641	0.0	TH	0728	0.9
	1228	6.3		1324	5.5
	1854	-0.2		1951	0.7
2	0107	6.8	17	0148	6.1
TH	0747	0.2	F	0827	1.0
	1329	6.2		1420	5.4
	2002	-0.1		2050	0.7
3	0216	6.8	18	0246	6.0
F	0856	0.1	SA	0924	1.0
	1438	6.1		1522	5.4
	2112	-0.2		2146	0.6
4	0330	6.9	19	0346	6.1
SA	1001	-0.2	SU	1018	0.8
	1553	6.3		1622	5.6
	2220	-0.5		2239	0.4
5	0444	7.1	20	0444	6.3
SU	1103	-0.5	M	1107	0.5
	1705	6.7		1718	6.0
	2321	-0.9		2329	0.1
6	0548	7.5	21	0537	6.6
M	1200	-0.9	TU	1153	0.2
	1806	7.2		1803	6.4
7	0019	-1.2	22	0016	-0.2
TU	0643	7.8	W	0619	6.9
	1253	-1.2		1237	-0.1
	1859	7.6		1845	6.8
8	0112	-1.4	23	0100	-0.5
W	0733	8.0	TH	0700	7.1
	1343	-1.4		1317	-0.3
	1948	7.9		1923	7.2
9	0204	-1.5	24	0144	-0.7
TH	0817	7.9	F	0738	7.3
	1430	-1.5		1357	-0.5
	2031	7.9		2000	7.5
10	0252	-1.4	25	0226	-0.8
F	0901	7.7	SA	0815	7.3
	1514	-1.4		1438	-0.7
	2116	7.8		2038	7.7
11	0337	-1.2	26	0310	-0.8
SA	0942	7.3	SU	0856	7.3
	1557	-1.1		1519	-0.7
	2158	7.6		2120	7.8
12	0421	-0.8	27	0352	-0.8
SU	1024	6.9	M	0938	7.2
	1639	-0.8		1600	-0.7
	2240	7.2		2205	7.7
13	0503	-0.3	28	0439	-0.6
M	1106	6.5	TU	1024	6.9
	1720	-0.3		1647	-0.5
	2324	6.9		2256	7.5
14	0545	0.1	29	0530	-0.3
TU	1149	6.1	W	1117	6.7
	1805	0.1		1738	-0.3
				2353	7.3
15	0007	6.5	30	0628	-0.1
W	0634	0.5	TH	1217	6.5
	1234	5.7		1839	0.0
	1854	0.4			
			31	0055	7.1
			F	0733	0.1
				1321	6.3
				1950	0.1

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.
HEIGHTS ARE RECKONED FROM THE DATUM OF SOUNDINGS ON CHARTS OF THE LOCALITY WHICH IS MEAN LOW WATER.

SAVANNAH RIVER ENTRANCE, GA., 1978

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

APRIL

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0204	6.9	16	0157	6.2
SA	0840	0.1	SU	0839	1.0
	1432	6.3		1435	5.7
	2102	0.1		2107	0.9
2	0318	6.9	17	0253	6.2
SU	0946	-0.1	M	0935	0.8
	1545	6.6		1535	5.9
	2208	-0.2		2203	0.7
3	0430	7.1	18	0353	6.3
M	1044	-0.4	TU	1026	0.5
	1654	7.0		1633	6.3
	2308	-0.5		2254	0.3
4	0533	7.3	19	0449	6.5
TU	1139	-0.7	W	1113	0.2
	1752	7.4		1723	6.8
				2342	0.0
5	0004	-0.8	20	0540	6.8
W	0627	7.5	TH	1156	-0.1
	1229	-1.0		1809	7.3
	1843	7.8			
6	0056	-1.0	21	0031	-0.4
TH	0714	7.6	F	0626	7.1
	1317	-1.1		1240	-0.4
	1929	8.1		1854	7.7
7	0145	-1.0	22	0117	-0.6
F	0757	7.6	SA	0707	7.3
	1401	-1.1		1326	-0.6
	2010	8.1		1935	8.1
8	0231	-0.9	23	0203	-0.8
SA	0836	7.4	SU	0751	7.4
	1445	-1.0		1410	-0.8
	2050	8.0		2017	8.3
9	0313	-0.7	24	0249	-0.9
SU	0915	7.1	M	0835	7.4
	1526	-0.7		1455	-0.8
	2126	7.7		2103	8.3
10	0352	-0.5	25	0337	-0.9
M	0952	6.7	TU	0921	7.2
	1606	-0.4		1542	-0.8
	2205	7.4		2150	8.2
11	0433	-0.1	26	0427	-0.7
TU	1029	6.4	W	1012	7.0
	1645	0.0		1632	-0.6
	2245	7.1		2245	7.9
12	0514	0.3	27	0520	-0.5
W	1109	6.1	TH	1109	6.8
	1728	0.3		1727	-0.3
	2327	6.8		2344	7.6
13	0557	0.6	28	0617	-0.3
TH	1154	5.8	F	1210	6.6
	1815	0.7		1829	0.0
14	0013	6.5	29	0047	7.3
F	0647	0.9	SA	0719	-0.1
	1242	5.7		1316	6.6
	1908	0.9		1938	0.2
15	0103	6.3	30	0153	7.1
SA	0742	1.0	SU	0824	-0.1
	1335	5.6		1424	6.6
	2008	1.0		2048	0.2

MAY

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0303	6.9	16	0206	6.3
M	0926	-0.2	TU	0848	0.7
	1533	6.9		1447	6.1
	2154	0.0		2124	0.8
2	0412	6.9	17	0302	6.3
TU	1025	-0.4	W	0940	0.4
	1638	7.2		1547	6.5
	2252	-0.2		2217	0.4
3	0511	7.0	18	0401	6.5
W	1115	-0.6	TH	1030	0.0
	1734	7.6		1643	7.0
	2345	-0.4		2307	0.1
4	0604	7.1	19	0457	6.7
TH	1204	-0.8	F	1119	-0.3
	1822	7.9		1734	7.5
5	0036	-0.5	20	0000	-0.3
F	0650	7.1	SA	0551	6.9
	1249	-0.8		1206	-0.6
	1907	8.0		1824	8.0
6	0122	-0.6	21	0048	-0.6
SA	0731	7.0	SU	0640	7.1
	1333	-0.8		1256	-0.9
	1945	8.0		1911	8.4
7	0208	-0.5	22	0141	-0.9
SU	0810	6.9	M	0728	7.3
	1415	-0.6		1344	-1.0
	2022	7.9		1959	8.6
8	0249	-0.4	23	0232	-1.0
M	0845	6.7	TU	0817	7.3
	1456	-0.4		1436	-1.1
	2057	7.7		2048	8.6
9	0327	-0.2	24	0321	-1.1
TU	0921	6.4	W	0907	7.3
	1536	-0.2		1527	-1.0
	2134	7.4		2139	8.4
10	0406	0.0	25	0414	-1.0
W	0958	6.2	TH	1003	7.1
	1614	0.1		1620	-0.8
	2211	7.2		2235	8.1
11	0445	0.3	26	0506	-0.9
TH	1037	6.0	F	1101	7.0
	1656	0.4		1717	-0.5
	2251	6.9		2333	7.8
12	0525	0.5	27	0602	-0.7
F	1119	5.8	SA	1203	6.9
	1741	0.7		1818	-0.1
	2336	6.7			
13	0609	0.7	28	0034	7.4
SA	1205	5.8	SU	0702	-0.5
	1829	0.9		1306	6.8
				1924	0.1
14	0023	6.5	29	0138	7.1
SU	0700	0.8	M	0803	-0.4
	1258	5.8		1411	6.9
	1924	1.0		2031	0.2
15	0114	6.4	30	0241	6.8
M	0753	0.8	TU	0901	-0.4
	1351	5.9		1517	7.0
	2024	1.0		2134	0.2
			31	0343	6.6
			W	0957	-0.5
				1615	7.2
				2231	0.1

JUNE

DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0443	6.6	16	0317	6.4
TH	1047	-0.5	F	0951	-0.2
	1711	7.4		1604	7.1
	2324	0.0		2236	0.1
2	0539	6.5	17	0417	6.5
F	1134	-0.6	SA	1045	-0.5
	1800	7.6		1703	7.6
				2331	-0.3
3	0014	-0.1	18	0518	6.7
SA	0624	6.5	SU	1136	-0.8
	1220	-0.6		1800	8.1
	1843	7.7			
4	0100	-0.2	19	0027	-0.6
SU	0705	6.5	M	0616	7.0
	1304	-0.5		1231	-1.1
	1922	7.7		1852	8.5
5	0143	-0.2	20	0120	-0.9
M	0743	6.4	TU	0709	7.2
	1347	-0.4		1325	-1.2
	1957	7.7		1945	8.7
6	0224	-0.1	21	0214	-1.2
TU	0820	6.3	W	0802	7.4
	1429	-0.3		1420	-1.3
	2033	7.5		2035	8.7
7	0304	0.0	22	0307	-1.3
W	0854	6.2	TH	0856	7.4
	1508	-0.1		1514	-1.2
	2107	7.4		2128	8.5
8	0342	0.1	23	0358	-1.3
TH	0930	6.1	F	0952	7.3
	1548	0.1		1608	-1.0
	2142	7.2		2222	8.2
9	0419	0.2	24	0450	-1.2
F	1008	6.0	SA	1049	7.2
	1627	0.3		1703	-0.7
	2221	7.0		2320	7.8
10	0456	0.3	25	0544	-1.0
SA	1048	5.9	SU	1149	7.1
	1709	0.6		1801	-0.3
	2302	6.8			
11	0536	0.4	26	0017	7.4
SU	1133	5.9	M	0638	-0.8
	1754	0.7		1250	7.0
	2346	6.6		1903	0.0
12	0621	0.5	27	0114	7.0
M	1221	6.0	TU	0735	-0.5
	1844	0.9		1348	7.0
				2006	0.3
13	0033	6.5	28	0213	6.6
TU	0708	0.5	W	0832	-0.4
	1312	6.1		1448	7.0
	1942	0.9		2108	0.4
14	0124	6.4	29	0313	6.3
W	0803	0.4	TH	0927	-0.3
	1404	6.4		1545	7.0
	2042	0.7		2204	0.4
15	0217	6.4	30	0413	6.1
TH	0856	0.1	F	1018	-0.3
	1503	6.7		1641	7.1
	2140	0.5		2258	0.3

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.
HEIGHTS ARE RECKONED FROM THE DATUM OF SOUNDINGS ON CHARTS OF THE LOCALITY WHICH IS MEAN LOW WATER.

SAVANNAH RIVER ENTRANCE, GA., 1978

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

JULY						AUGUST						SEPTEMBER					
DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.	DAY	TIME h.m.	HT. ft.
1	0508	6.1	16	0347	6.5	1	0004	0.6	16	0542	7.3	1	0057	0.5	16	0114	-0.9
SA	1107	-0.3	SU	1015	-0.5	TU	0614	6.1	W	1158	-0.8	F	0704	6.9	SA	0720	8.6
	1732	7.2		1638	7.7		1211	0.0		1824	8.5		1311	0.1		1336	-0.8
	2346	0.3		2307	-0.1		1830	7.3					1916	7.7		1948	8.8
2	0558	6.1	17	0452	6.7	2	0048	0.4	17	0043	-0.8	2	0138	0.3	17	0203	-1.0
SU	1152	-0.3	M	1115	-0.8	W	0653	6.3	TH	0641	7.7	SA	0738	7.1	SU	0808	8.7
	1817	7.4		1739	8.1		1254	0.0		1256	-1.1		1352	0.1		1425	-0.8
							1909	7.5		1917	8.8		1949	7.8		2036	8.6
3	0032	0.2	18	0006	-0.5	3	0130	0.3	18	0136	-1.1	3	0215	0.2	18	0250	-1.0
M	0640	6.2	TU	0555	7.0	TH	0730	6.4	F	0736	8.1	SU	0810	7.3	M	0854	8.7
	1237	-0.3		1211	-1.1		1338	-0.1		1351	-1.2		1432	0.1		1514	-0.6
	1857	7.5		1837	8.5		1944	7.5		2007	8.9		2024	7.7		2119	8.3
4	0117	0.1	19	0101	-0.9	4	0210	0.2	19	0227	-1.3	4	0250	0.1	19	0334	-0.8
TU	0718	6.2	W	0653	7.3	F	0805	6.5	SA	0827	8.3	M	0845	7.4	TU	0939	8.5
	1320	-0.3		1309	-1.3		1418	0.0		1444	-1.1		1511	0.1		1600	-0.2
	1934	7.5		1930	8.7		2017	7.5		2056	8.7		2057	7.7		2203	7.8
5	0159	0.1	20	0155	-1.2	5	0247	0.1	20	0316	-1.3	5	0326	0.1	20	0419	-0.4
W	0755	6.2	TH	0749	7.6	SA	0838	6.6	SU	0916	8.3	TU	0921	7.5	W	1024	8.2
	1402	-0.2		1405	-1.4		1457	0.0		1534	-0.9		1550	0.3		1645	0.2
	2008	7.5		2022	8.8		2049	7.5		2144	8.4		2134	7.5		2248	7.3
6	0238	0.0	21	0249	-1.4	6	0323	0.1	21	0403	-1.1	6	0402	0.1	21	0504	0.0
TH	0830	6.2	F	0843	7.7	SU	0913	6.7	M	1008	8.1	W	1001	7.6	TH	1111	7.8
	1444	-0.1		1500	-1.3		1536	0.1		1624	-0.6		1632	0.4		1730	0.7
	2042	7.4		2113	8.6		2124	7.4		2232	7.9		2216	7.4		2333	6.8
7	0316	0.1	22	0339	-1.4	7	0357	0.1	22	0450	-0.8	7	0440	0.2	22	0548	0.5
F	0905	6.2	SA	0936	7.8	M	0949	6.7	TU	1057	7.9	TH	1047	7.6	F	1157	7.4
	1523	0.0		1552	-1.1		1614	0.3		1713	-0.1		1717	0.6		1821	1.2
	2115	7.3		2206	8.3		2200	7.2		2322	7.4		2301	7.1			
8	0352	0.1	23	0429	-1.3	8	0432	0.1	23	0536	-0.4	8	0525	0.3	23	0021	6.5
SA	0939	6.2	SU	1031	7.7	TU	1027	6.8	W	1149	7.6	F	1138	7.5	SA	0639	0.9
	1601	0.2		1645	-0.8		1655	0.4		1804	0.4		1811	0.9		1248	7.1
	2151	7.1		2259	7.9		2242	7.1					2354	6.9		1916	1.5
9	0428	0.2	24	0519	-1.1	9	0509	0.2	24	0012	6.9	9	0620	0.5	24	0114	6.2
SU	1019	6.2	M	1127	7.5	W	1112	6.9	TH	0626	0.0	SA	1236	7.5	SU	0735	1.2
	1640	0.4		1738	-0.3		1741	0.6		1241	7.3		1913	1.0		1342	6.9
	2229	7.0		2351	7.4		2327	6.9		1900	0.9					2015	1.7
10	0504	0.2	25	0609	-0.7	10	0554	0.2	25	0103	6.4	10	0053	6.8	25	0211	6.0
M	1059	6.2	TU	1221	7.3	TH	1203	7.0	F	0718	0.4	SU	0724	0.6	M	0834	1.3
	1722	0.5		1834	0.1		1834	0.8		1332	7.0		1340	7.5		1438	6.8
	2312	6.8								1959	1.2		2022	1.0		2114	1.6
11	0543	0.2	26	0047	6.9	11	0017	6.7	26	0155	6.1	11	0159	6.7	26	0312	6.1
TU	1144	6.3	W	0702	-0.4	F	0645	0.3	SA	0816	0.7	M	0834	0.5	TU	0930	1.2
	1810	0.7		1316	7.1		1300	7.1		1428	6.8		1451	7.6		1535	6.8
	2357	6.7		1934	0.5		1936	0.9		2058	1.3		2130	0.7		2207	1.4
12	0628	0.2	27	0139	6.5	12	0113	6.6	27	0255	5.9	12	0311	6.8	27	0412	6.3
W	1234	6.5	TH	0757	-0.1	SA	0745	0.2	SU	0913	0.8	TU	0943	0.2	W	1022	1.0
	1905	0.8		1411	7.0		1359	7.2		1525	6.8		1604	7.8		1631	7.0
				2034	0.8		2041	0.8		2153	1.3		2230	0.3		2254	1.1
13	0047	6.5	28	0236	6.1	13	0215	6.5	28	0356	5.9	13	0425	7.2	28	0507	6.6
TH	0719	0.2	F	0852	0.1	SU	0851	0.1	M	1005	0.7	W	1046	-0.1	TH	1111	0.8
	1329	6.7		1511	6.9		1508	7.4		1623	6.9		1711	8.2		1721	7.3
	2006	0.7		2133	0.8		2147	0.5		2244	1.1		2329	-0.2		2339	0.8
14	0142	6.4	29	0334	5.9	14	0324	6.6	29	0454	6.1	14	0531	7.7	29	0552	7.0
F	0819	0.1	SA	0946	0.1	M	0956	-0.2	TU	1055	0.6	TH	1145	-0.5	F	1158	0.5
	1428	6.9		1607	6.9		1618	7.7		1715	7.1		1811	8.5		1804	7.5
	2108	0.6		2228	0.8		2249	0.1		2331	0.9						
15	0242	6.4	30	0433	5.9	15	0436	6.9	30	0542	6.3	15	0022	-0.6	30	0022	0.6
SA	0916	-0.2	SU	1038	0.1	TU	1057	-0.5	W	1142	0.4	F	0629	8.2	SA	0632	7.3
	1530	7.3		1702	7.0		1723	8.1		1800	7.3		1241	-0.7		1241	0.3
	2209	0.2		2316	0.7		2347	-0.3					1901	8.7		1845	7.7
			31	0529	6.0				31	0016	0.7						
			M	1124	0.1				TH	0624	6.6						
				1749	7.2					1227	0.3						
										1840	7.5						

TIME MERIDIAN 75° W. 0000 IS MIDNIGHT. 1200 IS NOON.
HEIGHTS ARE RECKONED FROM THE DATUM OF SOUNDINGS ON CHARTS OF THE LOCALITY WHICH IS MEAN LOW WATER.

Outdoors in Touch

edited by Susan K. Wood

A WORLD APART WINS AWARDS

Last spring the Department of Natural Resources released A WORLD APART, a coastal film which highlights saltwater sportfishing. A WORLD APART has been well received by environmental groups and sportsmen's clubs throughout Georgia. Now it has gained even wider recognition. The film was entered in three national and international film competitions, and it received awards from each.

A WORLD APART placed first in the advertising and sales category of the 19th Annual **Industrial Photography** Film Award Competition. The film also won a bronze Cindy, or third place, in the sports and recreation category of the 1977 Cindy Award Competition, sponsored by IFPA (Information Film Producers of America) Film and Video Communicators. At INTERCOM '77, the Sponsored Film and Videotape Competition of the Chicago International Film Festival, A WORLD APART earned a silver plaque in the science/ecology category.

A WORLD APART is available on a free-loan basis from DNR's Office of Information and Education.

GEORGIA TU COUNCIL PRESENTS WATER QUALITY REPORT TO STATE

Water quality is a serious matter to the Georgia Council of Trout Unlimited which has recently completed a one-year Water Quality Surveillance program on the Chestatee River headwaters in north Georgia.

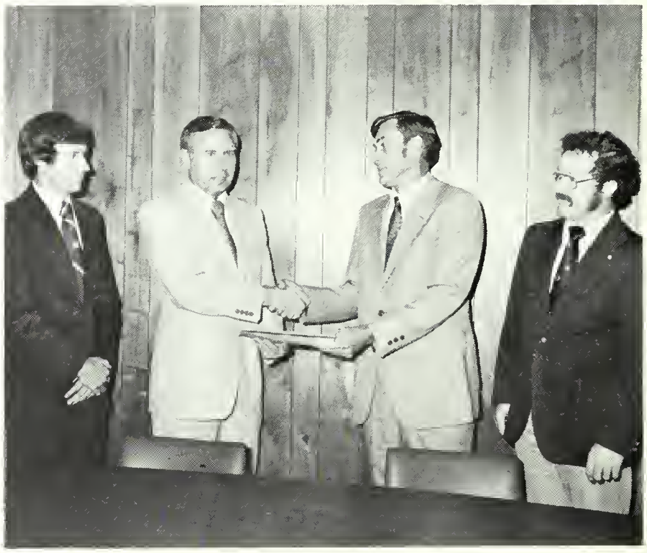
The Water Quality Surveillance (WQS) program is a standardized program established by Trout Unlimited National that is being implemented by participating local TU chapters and councils across the nation. In the WQS program, TU members conduct water quality tests on selected streams for eventual inclusion of test data into EPA's STORET computer data bank. The test data can also determine point and non-point pollution on a stream thus resulting in corrective action being taken for stream clean-up.

The Chestatee program depended heavily on a cooperative agreement between TU and DNR's Environmental Protection Division. The WQS Program proved that a responsible citizens group or conservation organization can work effectively with a government agency toward a common goal of preservation of a natural resource. Since water quality data were practically non-existent on this section of the Chestatee River previously, this WQS program has established a sound "baseline" of water quality data for the Chestatee headwaters. The headwaters of the Chestatee is an important trout resource to Georgia.

A second WQS program is currently in operation on the Etowah River headwaters in north Georgia. Testing is being conducted at five strategic locations in the headwater area. As with the earlier program, all three Georgia TU chapters—the Chattahoochee, Cohuttas and Flint River chapters—participate in the program.

Trout fisheries across the nation continue to be threatened by the various forms of pollution; Georgia's trout waters are no exception.

The Georgia Trout Unlimited chapters will continue to actively work toward preservation of trout habitat in both water quality and other programs designed to preserve and enhance trout resources.



Al Burtz (center right), chairman of the Georgia Council of Trout Unlimited, presented TU's final report of the WQS program to Leonard Ledbetetr (center left), head of DNR's Environmental Protection Division, while Bob Arnsdorff (left), EPD project coordinator, and Bill Surls (right), TU coordinator, look on.

GEORGIA TRAPPING

Georgia fur brought more than $2 million to the state's trappers and hunters last year, according to figures received by the Department of Natural Resources.

Terry Kile, chief of DNR's Game Management Section, said this is a continued upward trend of recent years brought on primarily by increased prices paid for fur as well as the effects of a depressed economy. The number of licensed trappers increased in Georgia last year by 33%, to a record total of just over 1,000.

Kile further indicated that studies concluded that around 40% of Georgia's fur bearers die from natural deaths each year, either through starvation, disease or old age. Many animals also fall prey to larger animals such as bobcats, foxes and wild dogs. "Trappers and hunters actually take less than 10% of the fur bearing population," Kile explained.

Trappers last year received $860,000 for raccoon pelts alone. Grey fox brought $550,000 while otters brought $126,000. Opossum brought $60,000; mink brought $52,000.

Almost all Georgia fur is exported from the state before it is used in the apparel industry. Georgia furs are normally lighter because of the warmer southern climate resulting in their use in larger garments such as coats. Heavier midwesterrn and northern fur is used primarily for collars and trims.

COMMITTEE TO INVESTIGATE FISH KILLS

Acting on a suggestion made to DNR Commissioner Joe D. Tanenr by Agriculture Commissioner Tommy Irvin, a joint committee has been formed to coordinate investigations of pesticide fish kills, which have become increasingly numerous in recent years.

DNR appointees to the committee are David Cranshaw, Director, Information and Education, Mike Gennings, Assistant Chief of Fisheries and Otis Woods, Chief Chemist with EPD.

The Department of Agriculture has appointed the following to join committee efforts: Jack Gilchrist, Director of Special Services and Ron Conley, Director of Pesticide Division.

In addition, Dr. Emmett Harris, State Pesticide Coordinator for the Georgia Cooperative Extension Service, will serve on the committee.

Pesticide fish kills present a threat to the natural resources of the state. Last August, for example, extensive fish kills were reported on the Apalachee River and at Hard Labor Creek State Park's Lake Brantley and were determined to have been agricultural-insecticide related.

CZM NOW PART OF DNR

Georgia's Coastal Zone Management (CZM) Program has been transferred from the State Office of Planning and Budget to the Department of Natural Resources, according to DNR Commissioner Joe Tanner.

The decision to relocate CZM was made October 17 by the Governor's Office and the two state agencies involved. The Governor's Office concurred with the recommendation by the Coastal Zone Management Advisory Council that the CZM Program should be administered by the Department of Natural Resources.

According to Tanner, this administrative assignment transfers six staff members from OPB to DNR. "This move will enable the CZM staff to use the planning resources of DNR to prepare the Governor's CZM legislative package for the next legislative session," Tanner said.

RANGERS HONORED

Congratulations are in order for two outstanding Conservation Rangers of the Game and Fish Division. Ranger Phillip Moss and Ranger Keith Swinford have been selected as Game and Fish Ranger of the Year for 1976 and 1977 respectively.

Ranger Moss, selected for 1976, pulls duty on the Chattahoochee River. Ranger Swinford, recipient for 1977, is assigned to Whitfield County.

This selection is based on nomination of field supervisors, review of performance, and evaluation by a board of their peers. They are then honored by the Safari-Shikari Clubs, International which supports the program.

We finally caught up with these hard-working guys as they were being presented custom hunting knives by Garth Fuller of Georgia Archery and Sport in Athens. The knives are by James Poplin of Washington, Georgia.

Left to right: Garth Fuller, Ranger Keith Swinford, Ranger Phillip Moss and Jack Crockford, Director of Game & Fish.

WILDLIFE TRIVIA . . . THINGS YOU MAY NOT KNOW

The wild goose has about twelve thousand muscles—ten thousand of which control the action of its feathers.

* * *

Hawks can see at least eight times as well as the most "hawk-eyed" human.

Letters to the Editor

Having lived in Georgia for ten years I would like to take this time to compliment you on the consistent improvement of your pubilcation.

I especially enjoy reading your fishing articles since I was an avid bass fisherman while living in Athens (5 years) and Tifton (5 years).

No doubt about it, your little magazine (Georgia GAME & FISH, *Outdoors in Georgia*) has become an enjoyable reading session for me up here in the "Big Apple."

Eric Meyer
Flushing, New York

* * *

I think your magazine is an excellent example of what a magazine of that type should be. I've been an outdoorsman with special emphasis on hunting. The writing is good. The pictures are better. In June 1977 "The Training of Bird Dog Puppies" by Bill Morehead was a real gem.

J. W. Locke
Dothan, Alabama

* * *

I don't really care too much whether you are "on schedule." What matters is the *quality* — and *Outdoors in Georgia* is tops. Keep up the good work.

About budget — you could easily ask more from us and get it. If you need help with the legislature, ask us to write. I shall anyway.

Rev. Wayland Brown
Augusta, Georgia

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Please mail me one copy of *Prince of Game Birds — The Bobwhite Quail*, as described in the September/October issue of *Outdoors in Georgia*. Enclosed is my personal check for same.

The inclusion of chapter one in the September/October issue was, for me, the real highlight of a very fine issue. It is always delightfully refreshing and rewarding to read the "real thing" — and it was exactly that. Bravo!

Leonard D. Reid
Millen, Georgia

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I've always renewed my subscription for three years at a time. This time a year may be more than I want if future editions are modeled on the September/October edition. Every article was on killing, how many available, new weapons, etc., etc. Even the one on hemorrhagic disease in deer only showed concern that deer hunting might suffer as a result of the disease. I'm sure there are many others besides myself who enjoy just having wildlife around us to watch.

Fenton B. Baker

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My wife and I have watched with some amusement and some anxiety the compulsive responses of hunters to the lack of hunter oriented articles in your magazine. We were quietly proud of your ability to discuss and publish intelligent and responsible conservation issues. We also appreciated your many naturalist and wildlife (without hunting emphasis) articles.

It seems the heat has gotten to you: as evidenced by your last issue of *Outdoors in Georgia* (September/October 1977.)

You have an honest and professional publication. As you know, knowledge of the world of nature is just as important as shooting animals. We read your magazine for this reason. Please don't abandon it.

Terry V. Bishop
Louisville, Alabama

Editor's Note: Thanks for the letter and the kind words. We acept all praise however faint.

In regard to the combined September/October hunting issue—there was no heat applied. It was merely an expression of our concern with all facets of the outdoor experience, particularly as they pertain to wildlife. While we would be the first to agree that there are certainly many more ways to appreciate wildlife than over the sight of a gun, we also feel that ethical and regulated hunting is a legitimate outdoor activity and use of certain wildlife species. We will in future issues of OIG continue to develop themes on all aspects of wildlife within the concept expressed best by, "To all things there is a season . . ."

AFP

* * *

Written only half in jest . . .

Please stick *Outdoors in Georgia* address labels somewhere else than on the front/back covers! Your pictures are too pretty to hide.

I have a problem: I've passed copies of Audubon magazines on to friends for years. Somehow I find it harder to give away my copies of *Outdoors in Georgia!* My apartment doesn't get any bigger.

And, where have you been all my life? I've just discovered you. Better late than never!

I promise to send your magazine to many names on my Christmas gift list.

Frances Shumate
Atlanta, Georgia

Editor's Note: We have investigated several alternatives to avoid labeling on front (or back) of the magazine. All have been prohibitively expensive.

* * *

Today in my dentist's office I came upon copies of your magazine. I am impressed with the articles that exude the Georgian atmosphere. Being a west coaster I have never been to Georgia and I must say I feel as though I had been after reading the issues I found. I am a woman of 82, a lover of America, and specifically of its history and outdoors. I feel you deserve a special "stroke" for issuing such a fine publication. I have seen much of the far West and appreciate the efforts to preserve our national outdoor wealth everywhere. The love of preserving our outdoor heritage is obviously a specialty in Georgia. Thank you for providing me with this special experience of getting to "see" your state.

Mrs. Paula Randall
Sierra Modre, California

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I am writing you concerning campsite availability at Georgia's state parks. I have a travel trailer, but do not utilize our state parks because there is not a reservation system. With three small children I do not want to get their hopes up about going to a state park and then find when we get there the campsites are full.

Florida's state parks do have a reservation system that seems to work quite well. My understanding is that they keep 50% of their campsites available for reservation by telephone and the remaining 50% are available on a first come, first served basis.

Why can't Georgia adopt Florida's reservation system? It seems to work well and I, for one, would like to be able to use our state parks.

Charles R. Farrell
Valdosta, Georgia

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We received this reply from Parks & Historic Sites:

We are presently evaluating the possible implementation of a computerized reservation program whereby people could call one number for renting cottages, initially, and subsequently reserve campgrounds throughout the parks and historic sites system. We, too, believe that it would be a great help to the travelers not only in our own state but to those from other states who presently are coming to Georgia in larger numbers.

However, we may still be a couple of years away from implementing such a program, provided funds can be obtained. We have not yet determined exactly how the program would be implemented insofar as camping is concerned, but it is being studied, and, hopefully, we will eventually be able to set up such a system.

I do hope that you and your family will use Georgia state parks whenever you have an opportunity to do so, and I really hope that we can implement this computerized reservation system at the earliest date possible.

Lonice C. Barrett, Chief
Recreation and Interpretive Programming
Parks and Historic Sites Division
Department of Natural Resources

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Having been a longtime admirer of the great job you do with *Outdoors in Georgia,* it was a tremendous shock to discover you are not infallible.

This was especially distressing to me personally, as your failure to research accurately affects my business.

Covey Rise Farm has had a commercial shooting preserve permit for two years and your failure to include it in your September/October listing of preserves is unforgivable.

You, undoubtedly, have heard from a number of readers about your incorrect locating of a number of counties in your Hunter's Forecast.

Oh well, your pictures are beautiful — even if your information is not reliable.

Francis O. Brown
Mayfield, Georgia

Editor's Note: We have been discovering that we are not infallible for so long that it no longer shocks us. However, our apologies for the omission of Covey Rise Farm in Mayfield. Likewise for the omission of Grandy Creek Shooting Preserve in Swainsboro. Neither facility was on the list we used to compile our shooting preserve directory. Thanks for bringing the matter to our attention.

The counties in the "Hunter's Forecast" were grouped by game management regions. While we know that Douglas County is not in East Central Georgia nor are Hancock and Putnam in West Central Georgia, they are included in game management regions which are loosely called "East Central" and "West Central."

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As a result of your article about Indian Springs, my daughter and I enjoyed a most happy day exploring the places I remember from childhood in that beautiful park.

Mr. Tanner had been very thoughtful in sending me the 1976 issue on endangered species after I inquired about them.

I did notice, however, that he omitted one very important species, that is, Nyoka the jungle girl. Until I read the article, I had thought I was the only surviving Nyoka.

The magazine is beautiful as well as educational. Where else would I have found another Nyoka?

Marge B. White
Byron, Georgia

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It took only a glance at the November 1977 issue of *Outdoors in Georgia* to notice a glaring error in my article "When Hunting, Thou Shalt . . . " on page 24. The top photograph shows a hunter cleaning a shotgun, and as any safety-conscious person would quickly recognize, it illustrates the WRONG way to clean a firearm (with action closed and from the muzzle end). Proper maintenance of a gun is important; however, this photo was intentionally taken to show how NOT to clean a gun. The caption should have reflected the intent of the photo.

Please advise your readers of this correction. Thank you.

Steven W. Ruckel
Regional Education Coordinator

Consider them advised.

J. CRAWFORD
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